

Death Scene Investigation

Procedural Guide

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Table of Contents

Preface	xxv
Acknowledgments	xxvii
Author	xxix
Foreword	xxxix

Section I

DEATH SCENE INVESTIGATION

1	Initial Response	3
	Notification	3
	Scene Coordination	3
	Arrival at Scene	4
	Immediate Actions	4
	Emergency Medical Services (EMS)	4
	Law Enforcement First Responders	5
	Legal Authority	5
	Identifying Scope of Scene	5
	Identifying Ancillary Scenes	5
	Administrative Scene Controls	6
	Major Scene Considerations	6
	Media Area	7
	Command Briefings	7
2	Scene Evaluation, Analysis, Strategy, and Direction	9
	Death Scene Response	9
	Initial Information	9
	Arrival at Scene	9
	Scene Evaluation	9
	Initial Walk-Through	9
	Preliminary Examination of Deceased	10
	Movement to Body: Point-to-Point Search	10
	Determine Death	10

Presumptive Determination of Death	10
Victim Alive, Expected to Die	10
Preserving Perishable Evidence on Clothing or Body	10
Postmortem Indicators	11
Pronouncement of Death	11
EMS	11
Medical Doctor	11
Justice of the Peace	11
Coroner	11
Identify, Secure, and Preserve Primary Scene	11
Identify, Secure, and Preserve Secondary Scenes	12
The Body: Primary and Secondary Scenes	12
Preserve Perishable Evidence	12
Note Scene Indicators	13
Documentation of Injury	13
Documentation of Postmortem Indicators	13
Investigative Plan and Scene Strategy	13
Scene Considerations	14
Order of Processing	14
Investigative Plan	14
Determine Investigative Direction	15

3 Natural Deaths 17

Definition of Natural Death	17
Legal Considerations	17
Death Scene Interviews	18
First Responders	18
Family Members	18
Decedent's Physician	18
Scene Considerations	19
Recovery of Human Remains	19
Initial Approach and Contact with Body	19
Initial Approach	19
Preliminary Determination of Death	20
Documentation, Preservation, and/or Collection of Perishable Evidence	20
Post Mortem Indicators	20
Death Scene Processing	21
Take Control of Scene	21
Conduct Initial Scene Walk-Through	22
Legal Determination of Death	22

Plan Development	22
Conduct Team Briefing	22
Scene Processing	23
Documenting Scene Indicators	24
Identifying Secondary Death Scenes	24
Processing Body	24
Photographing Body	24
Sketching Body	25
Documenting with Notes	25
Examination of Body	25
Outdoor Death Scenes	26
Common Indicators of Natural Death	26
Related Searches	26
 4 Accidental Deaths	 27
Definition of Accidental Death	27
Legal Considerations	27
Death Scene Interviews	28
First Responders	28
Witnesses	28
Gunshot Residue (GSR) Examination and Collection	28
Scene Considerations	29
Recovery of Human Remains	29
Initial Approach and Contact with Body	29
Initial Approach	29
Preliminary Determination of Death	30
Documentation, Preservation, and/or Collection of	
Perishable Evidence	30
Post Mortem Indicators	30
Death Scene Processing	31
Take Control of Scene	31
Conduct Initial Scene Walk-Through	31
Legal Determination of Death	32
Plan Development	32
Conduct Team Briefing	32
Scene Processing	32
Documenting Scene Indicators	33
Identifying Secondary Death Scenes	34
Processing Body	34
Photographing Body	34
Sketching Body	35

Documenting with Notes	35
Examination of Body	35
Outdoor Death Scenes	36
Evidence Commonly Associated with Accidental Deaths	36
Related Searches	36
5 Suicidal Deaths	37
Definition of Suicide	37
Legal Considerations	37
Death Scene Interviews	38
First Responders	38
Gunshot Residue (GSR) Examination and Collection	38
Scene Considerations	38
Recovery of Remains	39
Initial Approach and Contact with Body	39
Initial Approach	39
Preliminary Determination of Death	39
Documentation, Preservation, and/or Collection of	
Perishable Evidence	39
Post Mortem Indicators	40
Death Scene Processing	41
Take Control of Scene	41
Conduct Initial Scene Walk-Through	41
Legal Determination of Death	41
Plan Development	41
Conduct Team Briefing	42
Scene Processing	42
Documenting Scene Indicators	43
Identifying Secondary Death Scenes	43
Processing Body	43
Photographing Body	44
Sketching Body	44
Documenting with Notes	44
Examination of Body	45
Outdoor Death Scenes	46
Evidence Commonly Associated with Suicides	46
Related Searches	46
6 Homicidal Deaths	47
Definition of Homicide	47
Legal Considerations	47

Death Scene Interviews	48
First Responders	48
Witnesses	48
Gunshot Residue (GSR) Examination and Collection	49
Scene Considerations	49
Recovery of Human Remains	49
Initial Approach and Contact with Body	50
Initial Approach	50
Preliminary Determination of Death	50
Documentation, Preservation, and/or Collection of	
Perishable Evidence	50
Post Mortem Indicators	50
Death Scene Processing	51
Identifying Primary and Secondary Death Scenes	51
Primary Scene	51
Secondary Scenes	52
Take Control of Scene	52
Conduct Initial Scene Walk-Through	52
Legal Determination of Death	52
Plan Development	52
Conduct Team Briefing	53
Scene Processing	53
Document Scene Indicators	54
Processing Body	54
Photographing Body	55
Sketching Body	56
Documenting with Notes	56
Examination of Body	57
Outdoor Death Scenes	58
Evidence Commonly Associated with Homicidal Deaths	58
Related Searches	58

7 The Role of Medical Examiner 59

Establishing Cause of Death	60
Establishing Manner of Death	60
Death Scene	60
Scene Considerations	60
On-Scene Body Processing Procedures	61
Circumstances Requiring Autopsy	61
Procedures in Lieu of Autopsy	62
Reports and Reporting	63

	Outbrief	63
	Preliminary Autopsy Report	63
	Toxicology Report	63
	Final Autopsy Report	63
8	Autopsy Protocol and Investigator's Role	65
	Circumstances Requiring Autopsy	65
	Procedures in Lieu of Autopsy	66
	Investigator's Responsibilities at Autopsy	66
	Equipment Required	66
	Arrival	66
	External Examination	67
	Internal Examination	68
	After Examination	68
	Autopsy Photography Guidelines	68
	General	68
	ME Photographer	69
	Investigator	69
	Required Photographs and Documentation	69
	Injury Mapping	70
	Internal Examination Photographs	72
	Evidence Photographs	72
	Custody of Evidence from Autopsy	72
	Outbrief with Medical Examiner	73
	 Section II	
	RECOVERY OF REMAINS	
9	Searching for Human Remains	77
	General Search Guidelines	77
	Specific Search Guidelines	77
	Point-to-Point Search	77
	Line Search	79
	Grid Search	79
	Spiral Search	80
10	Surface Recovery of Human Remains	81
	General	81
	Locating Remains	81

Visual Techniques	81
Cadaver Dogs	82
Forward Looking Infrared (FLIR) and Thermal Tomography	82
NecroSearch International	82
Body Processing	82
Scene Processing	83
Establishing Datum	83
Establishing Grid	83
Surface Documentation and Recovery of Evidence	86
Recovery of Remains	86
Sifting Soil	87
Scientific Assistance	87
11 Recovery of Buried Human Remains	89
General Principles	89
Locating Remains	89
Visual Methods	89
Expedient Grave Indicators	89
Shallow Grave Indicators	90
Buried Remains Indicators	90
Probing Method	90
Cadaver Dogs	91
Technological Methods	91
NecroSearch International	92
Processing Scene	93
Surface Documentation and Recovery of Evidence	93
Surface Preparation	93
Establishing Datum	93
Establishing Grid	93
Preparing Sifting Site	96
Excavating Grave	96
Sifting Soil	99
Impression Evidence	99
Soil Evidence	99
12 Aquatic Recovery of Human Remains	101
General Principles	101
Locating Remains	101
Surface Search	101
Aerial Search	102
Underwater Search	102

Drift	103
Computer Simulation Modeling	103
Cadaver Dogs	103
Technological Search	104
Trained Volunteer Teams	105
Processing Scene	106
Processing Body	106
Documenting Recovery	106
Remains Recovered from Predator	107

13 Estimating Postmortem Interval 109

Determining Time Range	109
Immediate Postmortem Changes	109
Early Postmortem Changes	109
Postmortem Lividity (Livor Mortis)	109
Postmortem Rigidity (Rigor Mortis)	110
Postmortem Cooling (Algor Mortis)	110
Factors Affecting Rate of Temperature Change	111
Late Postmortem Changes	111
Decomposition	111
Adipocere Development	111
Mummification	111
Skeletonization	112
Other Postmortem Factors	112

Section III

WOUND DYNAMICS AND MECHANISMS OF INJURY

14 Asphyxiation 115

Strangulation	115
Manual Strangulation (Throttling)	115
General	115
Scene	115
Body	116
Ligature Strangulation (Garroting)	116
General	117
Scene	117
Body	117

Hanging	118
General	118
Scene	118
Body	119
Autoerotic Asphyxiation	120
General	120
Scene	120
Body	121
Choking	121
General	121
Scene	121
Body	121
Smothering	121
General	122
Scene	122
Body	122
Mechanical Asphyxia	123
General	123
Scene	123
Body	123
Chemical Asphyxia	124
General	124
Scene	124
Helium or Nitrogen Scene (Exit Bag or Exit Hood)	124
Carbon Monoxide Scene: Heater	125
Carbon Monoxide Scene: Vehicle	125
Body	126
Drowning	126
General	126
Scene	126
Body	127
15 Sharp Force Injuries	129
General	129
Scene	129
Body	129
16 Blunt Force Injuries	133
General	133
Scene	133
Body	133

17	Chopping Injuries	135
	General	135
	Scene	135
	Body	135
18	Firearms: Handgun and Rifle Wounds	137
	Gunshot Wounds	137
	Entrance and Exit Wounds	137
	Entrance Wounds	137
	Exit Wounds	137
	Effects of Distance on Gunshot Wounds	138
	Contact Gunshot Wounds	138
	Hard Contact Wounds	138
	Loose Contact Wounds	139
	Angled Contact Wounds	139
	Incomplete Contact Wounds	141
	Near Contact Wounds	141
	Intermediate Range Wounds	142
	Distant Wounds	143
	Rifle Wounds	143
19	Firearms: Shotgun Wounds	145
	Shotgun Wounds	145
	Exit Wounds	145
	Shotcup and Wadding	145
	Effects of Distance on Wounds	145
	Contact Wounds	145
	Stellate Wounds	147
	Hard Contact Head Wounds	147
	Intra-Oral Wounds	147
	Wounds to Trunk	147
	Near Contact Wounds	147
	Close and Intermediate Range Wounds	147
	Long Range Wounds	149
20	Explosive Injuries	151
	General Considerations	151
	Scene	151
	Body	152

Mechanisms of Blast Injuries	152
Primary	152
Secondary	152
Tertiary	153
Quaternary	153
Cautions	153
21 Thermal Injuries	155
General Considerations	155
Scene	155
Body	156
First Degree Burns	156
Second Degree Burns	156
Third Degree Burns	157
Fourth Degree burns	157
Deaths from Fire-Related Injuries	157
22 Electrical Injuries	159
Scene	159
Body	159
 <i>Section IV</i>	
SPECIAL DEATH SCENE INVESTIGATIONS	
23 Infant Deaths	163
Violent Death	163
Asphyxial	163
Asphyxial by Entrapment (Rollover)	163
Shaken Baby Syndrome and Shaken Baby with Impact Syndrome	164
Medical Findings	164
Failure to Thrive	165
Organic Causes	165
Neglect	165
Sudden Unexplained Infant Death (SUID)	166
Victim	166
Scene	167

	Dietary History	168
	Medical History	169
	Mother's Pregnancy History	170
24	Child and Infant Deaths: Physical Abuse and Neglect	171
	Scene	171
	Weapon or Item Used to Inflict Injury	171
	Burns, Scalds, Immersion Burns	171
	Falling Injuries and Staged Accidents	172
	Neglect	172
	Body	173
	Skeletal System Injuries	173
	Skin and Subcutaneous Tissue Injuries	173
	Immersion, Contact, and Cigarette Burns	174
	Head and Central Nervous System Injuries	175
	Chest and Abdominal Injuries	176
	Autopsy	176
	Additional Questions for Medical Examiner	177
	Medical Records Review	177
25	Child Deaths: Sexual Abduction and Murder	179
	Abduction	179
	Missing Child Report	179
	Scene	180
	Sexual Assault	180
	Searches Related to Pedophile	180
	Murder	182
	Body Recovery	183
	Evidence on Body	183
	Examination of Suspect	184
26	Sexual Activities Resulting in Death	185
	Natural Death during Coitus	185
	Body	185
	Scene	185
	Accidental Death during Autoerotic Asphyxia	185
	Body	186
	Scene	186
	Homicide: Sexual Asphyxia by Partner	186

	Face Sitting and Breath Control	186
	Body	186
	Scene	187
	Body	187
	Scene	187
27	Sexual Assaults Resulting in Death	189
	Examination of Victim	189
	Sexual Assault Evidence	189
	Physical Assault Evidence	190
	Examination of Suspect	190
	Examination of Intimate Partner	191
	Scene Considerations	191
28	Death Scenes with Multiple Victims	193
	Multiple Victims at a Single Location	193
	Spree Killings	193
	Mass Murders	194
	 Section V	
	DEATH SCENE MANAGEMENT, TASKS, AND RESPONSIBILITIES	
29	Death Scene Management	197
	Arrival and Initial Organization	197
	Strategy and Direction	197
	Available Personnel	198
	Scene Documentation and Processing	198
	Command Function	198
	Scene Completion and Post-Scene Activities	199
30	Death Scene Sketching	201
	Sketch Components	201
	Depictions	201
	Sketch Types	203
	Scene Measurements	204
	Methods of Measuring	207
	Evidence Identification	210

31	Death Scene Photography and Videography	211
	Photography	211
	Set-Up	211
	Technique	211
	General Guidelines	212
	Flash Use	213
	Filter Use	214
	Scene Photography	214
	Overlapping Method	214
	Progressive Method	214
	Photographing Evidence	214
	Photographic Perspectives	215
	Videography	217
	Set-Up	217
	Technique	217
	Videography Subjects	217
 32	 Death Scene Notes and Observations	 219
	Scene Observation	219
	Indoor Scene Observations	219
	Doors	219
	Windows	220
	Kitchen and Dining Room	220
	Environmental Controls	220
	Laundry and Utility Areas	220
	Lighting	220
	Telephones and Mobile Phones	220
	Mail	220
	Wastebaskets and Ashtrays	221
	Bath and Toilet Areas	221
	Calendars and Planners	221
	Computers and Internet	221
	Body	221
	Clothing	221
	Postmortem Indicators	221
	Identification of Decedent	222
	Wounds and Injuries	222
	Outdoor Scene Observations	222
	Environmental Conditions	222

Immediate Area of Death Scene	222
Extended Area of Death Scene	222
33 Death Scene Search Procedures	223
General Search Guidelines	223
Confined Area Searches	223
Point-to-Point Search	223
Clockwise and Counterclockwise Search	224
High and Low Search	224
Sector or Zone Search	224
Open Area Search	225
Line Search	226
Grid Search	226
Spiral Search	226
Specific Search Guidelines	228
Body Search	228
Vehicle Search	229
Exterior	229
Interior	229
Trunk	229
Engine Compartment	229
Computer Search	230
Seizure	230
Analysis	230

Section VI

DEATH SCENE EVIDENCE PROCESSING

34 Documenting and Processing Bloodstain Patterns	233
Detection	233
Visual Method	233
Alternate Light Source (ALS) Method	234
Infrared (IR) Method	234
Chemical Enhancement Method	235
Luminol	235
BlueStar®	236
Fluorescein	236
Isolation and Identification of Discrete Patterns	236

Spatter	236
Linear Spatter	236
Non-Linear Spatter	237
Non-Spatter	237
Documentation	238
Mapping	238
Clothing	240
Mapping Large Area Patterns	240
Photography	241
Sketching	241
Sampling and Collection	241

35 Documenting Shooting Scenes 243

Recovery of Firearm Evidence from Scene	243
Weapon	243
Safety: Paramount Concern	243
Firearm Documentation	243
Ensuring Weapon Safety	244
Processing Weapon at Scene	244
Collection and Packaging of Firearm	244
Recovery of Firearm from Water	244
Recovery of Casings, Cartridges, and Bullets	245
Collection and Packaging of Bullets and Cartridges	245
Additional Analyses	245
Documenting Bullet Defects	245
Chemical Testing for Bullet Defects	247
Copper	247
Lead	247
Recovery of Firearm Evidence from Body and clothing	248
Detection of Gunpowder Patterns	248
Visual	248
Infrared (IR)	248
Collection and Packaging of Clothing	249
Documentation and Collection of Gunshot Residue (GSR)	250
Gunshot Wounds of Suicide	250
Scene	250
Body	251
Mechanisms of Injury	251
Wound Dynamics	251

36	Entomological Evidence	253
	Adult and Flying Insects	253
	Collection of Crawling Insects	253
	Collection of Maggots, Pupae, and other Immature Insect Forms	253
	Collection of Insects in Soil	254
	Documentation	254
37	Biological Evidence	255
	Touch DNA Analysis	255
	Detection	255
	Preservation and Collection	255
	Biological Fluids and Stains	256
	Detection	256
	Scene Analysis	256
	Collection of Biological Stains	256
	General	257
	Dry Stains	257
	Wet Stains	258
	Liquid Stains	258
	Packaging	258
38	Trace Evidence at the Scene	261
	General Processing Guidelines	261
	Detection	261
	Collection	261
	Packaging	262
	Hairs	262
	Fibers	263
	Paint	263
	Collection	263
	Control Samples	263
	Known Samples	263
	Packaging	264
	Glass	264
	Collection	264
	Packaging	264
	Building Materials	265
	Collection	265

Soil	265
Collection	265
Known Sample	265
Alibi Sample	266
Packaging	266
Trace Metals	266
Collection	266
Hazardous Materials	267
39 Friction Ridge Evidence at the Scene	269
Prints on Body	269
Patent Prints (Visible)	269
Latent Prints	270
Detection	270
Transfer Lift Method (Figure 39.1)	270
Prints at Scene	271
General	271
Detecting Prints	272
Oblique Lighting	272
Reflected Ultraviolet Imaging System (RUVIS)	272
Alternate Light Sources	272
Photography of Prints	272
Prints on Non-Porous Surfaces	273
Superglue (Cyanoacrylate) Fuming	274
Prints on Porous Surfaces	274
Chemical Development of Latent Prints	275
Latent Prints on Non-Porous Surfaces	275
Packaging Latent Print Evidence	275
Non-Porous	275
Porous	276
40 Impression Evidence	277
Toolmarks and Bites	277
General	277
Detection	277
Photography	277
Processing and Casting Toolmarks	278
Bite Marks: Special Considerations	278

Footwear and Tire (Three-Dimensional) Impression Evidence	279
General	279
Detection	280
Photography	280
Processing and Casting	280
Impressions in Snow	281
Tire Marks: Special Considerations	281
Packaging	282
Footwear and Tire (Two-Dimensional) Impression Evidence	282
Photography	282
Detection	282
Processing	283
Electrostatic Dust Print Lifter	283
Stati-Lift®	284
Gel Lift	284
Tape Lift	284
Moist Impression	285
Processing: Wet	285
Processing: Dry	285
Packaging	285
Appendix A: Universal Precautions for Blood Borne Pathogens	287
Appendix B: Death Scene Notes	291
Appendix C: Death Scene Notes: Supplemental	293
Appendix D: Biological Evidence Notes	295
Appendix E: Friction Ridge Evidence	297
Appendix F: Impression Evidence Notes	299
Appendix G: Trace Evidence Notes	301
Appendix H: Death Scene Entry log	303
Appendix I: Photographic Log	305
Appendix J: Photographic Head Slate	307
Appendix K: Immersion Burn Worksheet	309

Appendix L: SUID Scene Worksheet	311
Appendix M: Firearms Documentation worksheet	319
Appendix N: Post Blast Worksheet	321
Appendix O: Druggist Fold	323
Appendix P: Post Mortem Indicators Worksheet	325

Preface

This book is meant to be used at the scene as a practical field guide when responding to a death investigation. Some information in the various chapters of the guide may seem repetitious; this is meant to facilitate its field use by minimizing the need to flip back and forth while processing the scene. The guide is separated into the following sections for ease of use:

Section I, Death Scene Investigations includes procedures for preparing to and responding to the scene. The death investigation decision tree provided in Chapter 2 is an easy-to-follow process to lead the investigator to a preliminary indication of cause of death. The investigator then uses the appropriate chapter in Section I to facilitate a thorough scene investigation.

Section II covers the **Recovery of Human Remains** from open field, aquatic, and buried sites, as well as search techniques to locate clandestine graves.

Section III details **Wound Dynamics** and the evidence they may present at the scene.

Section IV is used to supplement the death investigation when **Special Death Scene Investigations** such as child or infant deaths, sexual deaths, or scenes involving multiple victims are encountered.

Section V, Death Scene Management, Tasks, and Responsibilities covers the responsibilities, duties, and the necessary techniques to accomplish death scene management, documentation, evidence processing, and death scene procedures.

The appendices include information on processing bloodborne pathogens, a series of worksheets that may be reproduced to assist the investigators at the scene thorough documentation of their activities, and a sudden unexplained infant death investigative report form.

Acknowledgments

The foundation for this guidebook was established in 1996 while I was involved in co-authoring a government publication, *The Field Guide for Crime Scene Processing*, for the Naval Criminal Investigative Service (NCIS). This guidebook covered not only basic crime scene investigation techniques, but also chapters dealing with death investigations. It has been 15 years since my involvement with the publication of that guide book. It is my hope that following the concept of that field guide, a guide specific to death scene investigations, will be useful. Though the concept for this guidebook is borrowed from that publication, the information and procedures have largely been rewritten, updated, and expounded upon while writing with the law enforcement death scene investigator in mind rather than the military special agent. I would like to thank the co-author of that original guidebook, Special Agent (Retired) Donald Housman. The dynamics of working with him during my career as a forensic consultant was truly phenomenal; any thoughts, reports, research, or process I was involved in the development of were sharper, clearer, and more relevant as a result of working with him.

I would also like to thank Special Agent Thomas Brady, NCIS senior forensic consultant, for his insights and approach to death scene analysis and for being my partner at death scene locations I would rather not visit again; Lou Eliopolus, chief of NCIS Forensic Science Division, author and the best homicide analyst I have ever met; Detective Lou Camelbeek, Tom Green County Sheriff's Office (Retired) for teaching me what it meant to be a law enforcement officer; Ted McDonald and Chris Stewart, senior instructors at the Federal Law Enforcement Training Center, for their incredible expertise in all aspects of crime and death scene investigations; Iris Dalley of Bevel, Gardner and Associates for reviewing the original manuscript; the special agents of the NCIS and, in particular, the Forensic Science Division; and Paul Susanbach, who knows what he has done.

My thanks to Becky Masterman, David Fausel, and Prudy Board of CRC Press for putting up with a first-time author and all of the frustration that goes with it as well as Tom Bevel and Ross Gardner for introducing them to me.

Author

Michael Maloney is a partner with Bevel, Gardner and Associates. He holds a Master of Forensic Science degree from the George Washington University as well as having completed a Fellowship in Forensic Medicine from the Office of the Armed Forces Institute of Pathology. For sixteen years he served as a special agent for the Naval Criminal Investigative Service (NCIS) and spent his last ten years as a senior forensic consultant. Prior to his retirement after 25 years of Federal Service he was the senior instructor for death investigations and sex crimes in the Forensic and Investigative Skills Branch of the Federal Law Enforcement Training Center with the Department of Homeland Security.



Mr. Maloney has undergone extensive training and is considered a subject matter expert in a variety of forensic disciplines including death/crime scene reconstruction, death/crime scene processing, wound dynamics/evidence of injury, and bloodstain pattern analysis. He is the former president of the Association for Crime Scene Reconstruction and has held membership with the American Academy of Forensic Science, International Association of Bloodstain Pattern Analysts, and the International Association of Identification.

Mr. Maloney has been responsible for providing forensic investigation, coordination, and reconstruction for incidents involving death investigations, serial crimes, and crimes of extreme violence. He processed and reconstructed the terrorist attack on the North Arabian Gulf Oil platforms during Operation Iraqi Freedom. He served with the International War Crimes Tribunal for the former Yugoslavia in Bosnia where he led the forensic processing and reconstruction on two sites of mass execution. He also served as an onsite forensic consultant to the Weapons of Mass Destruction Task Forces at the Olympic Games in Atlanta Georgia and the Summit of Eight

Conference in Denver, Colorado. He recently processed and reconstructed the events surrounding the death of 24 Iraqi citizens in Haditha, Iraq. He was recognized for his innovative approach to this scene as the 2008 recipient of the August Vollmer Award presented by the International Association of Chiefs of Police (IACP).

Foreword

Death Scene Investigation: Procedural Guide is the answer to a long recognized dilemma—how to have every death investigated by an experienced death investigator. Using his considerable experience in death investigations and forensics, Mr. Maloney has created a procedural guide that gives everyone including the medical examiner’s investigator, coroner, crime scene investigator, or detective an on scene guide for processing the death scene. This field guide will assist in understanding the story the scene tells as well as developing investigative direction. The Death Investigation Decision Tree is an innovative, easy to use tool that ensures the scene investigation is focused, directed, and complete while prompting the investigator to see the “red flags” that are present but sometimes overlooked. This should be the first tool used on the scene after familiarization with the scene and basic facts. Easy to follow chapters and complete bulleted procedures are presented in a manner that minimizes the need to flip back and forth through the guide. The spiral bound format is designed to fit in a cargo pocket for easy access and transport to the scene. Unlike textbooks, this guide stands out because it is specifically designed for use in the field. The medical examiner, coroner, and homicide detective should not overlook this guide as well; it is a handy reference for proper procedures to employ in a wide variety of death scenes.

Tom Bevel

President of Bevel, Gardner & Associates, Inc.

Death Scene Investigation

I

Initial Response

1

Notification

The first receipt of information of a death or possible death by a death scene investigator (DSI) formally begins the death scene documentation process. Death scenes are documented through notes, photography, and sketching. Documentation begins with note taking—recording the following information:

- Method of notification
- Person making notification
- Time of notification
- Description of death scene (outdoor, indoor, residential, commercial area, etc.)
- People present at death scene (law enforcement, medical, coroner, family, etc.)
- Reported crime (suspicious death, murder, sex crime, child abuse, burglary, etc.)
- Identification and security of scene (agency currently in charge)
- Body at scene (if not at scene, where is it?)
- Authority who pronounced victim dead
- Safety hazards or unique considerations at scene (electrocution, poisonous gases, unstable terrain, civil insurrection, etc.)
- Information about suspects and witnesses still in area
- Other agencies notified and responding

Scene Coordination

It is important to determine who has investigative jurisdiction over the physical location of the death scene, the body of the deceased, the type of offense committed, and interdepartmental responses.

- Determine investigative jurisdiction and what agency will have lead investigative responsibility.

- If matter will be tasked for out-of-jurisdiction response, coordinate with requesting agency.
- If an inter-departmental response involving patrol, death scene unit, and/or investigative units is anticipated, coordinate with on-scene patrol supervisor and lead investigator assigned to case.
- Coordinate with local medical examiner or coroner. In most jurisdictions, the body is theirs! Coordinate your scene work and processing of the body, or follow prescribed standard operating procedure (SOP).
- If the victim has been transported to a medical facility, remember, the victim *is* the primary death scene; all others are secondary. Ensure someone responds to the victim's location.
- If the initial scope and description of the death scene indicate a need for interagency assistance, begin coordination with appropriate agencies or departments. For example a scene involving unstable ground, a building or requiring lighting, or an underwater death scene may need assistance from the fire department, rescue squad, or other crime scene investigation (CSI) units.

Arrival at Scene

Initial arrival at the scene may often be chaotic. The presence of first responders, law enforcement, fire or rescue, emergency medical service, and agencies from multiple jurisdictions will impact order at a scene. During the initial response, the primary concerns are safety, determining who has primary responsibility, establishing scene boundaries, and protecting physical evidence.

Immediate Actions

- Note arrival time.
- Determine whether injured require medical assistance; obtain aid as appropriate.
- Determine whether specific scene hazards such as continuing tactical operations, toxic environment, or imminent structural collapse must be addressed.

Emergency Medical Services (EMS)

- If emergency medical services (EMS) are on scene, immediately photograph the location of injured being treated to enable later documentation of spatial relationships at death scene.

- If EMS have arrived, take immediate steps to document and collect perishable items of evidence that may be disturbed through their lifesaving efforts.
- If EMS or the medical examiner already transported victims (or suspects) from the scene, ensure a DSI response to that location to collect and document evidence and injury information.

Law Enforcement First Responders

- Determine who entered the death scene and any items they may have touched or disturbed.
- It is not unusual or unexpected for first responders to have to touch or move items within a scene. Lights may have been turned on, a weapon made safe, or a body position altered to check for signs of life.
- Ensure that all changes are recorded.

Legal Authority

- Determine your legal authority to be present and to conduct a death scene examination. At some point the exigency for responding and caring for victims will end.
- What is your continued authority to remain on scene and collect evidence, for example, a search warrant, permissive authorization to search, no reasonable expectation of privacy?

Identifying Scope of Scene

- Determine whether scene has been adequately identified and its perimeter secured. If not, enlarge perimeter as necessary ([Figure 1.1](#)).
- Determine whether likely areas by which a perpetrator would have entered or exited the scene and subsequently identified paths of travel have been identified and secured.

Identifying Ancillary Scenes

Each of the items cited below represents an ancillary or secondary death scene. All secondary scenes must be secured in the same manner as a primary scene.

- First, determine whether the initial information indicates the possibility of ancillary or secondary death scenes.
- A surveillance location is where the perpetrator observed the victim and/or the victim's habits, selected a victim, or planned the attack, and may include the area where the perpetrator lay in wait for the victim.

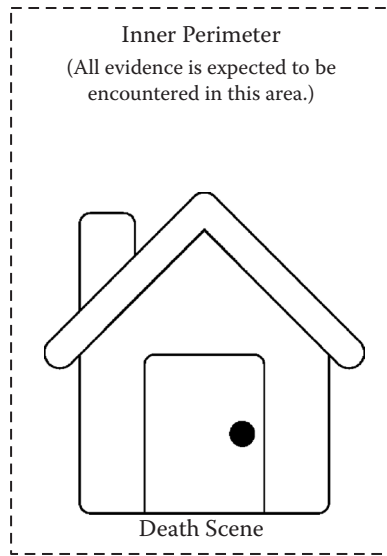


Figure 1.1 Establishing death scene perimeter.

- An ambush location is where the perpetrator first makes contact with the victim and gains control.
- The method of transportation or conveyance for moving the victim before or after the death is another secondary scene.

Administrative Scene Controls

- Identify a point of entry and exit for those working the scene; establish an entry control point, a controller (preferably law enforcement), and a death scene entry log.
- Determine what level of personal protective equipment (PPE) is required for the scene and establish PPE guidelines for entry (Appendix A).
- After the scene perimeter is established, designate an area outside the perimeter for DSIs to work on sketches, process scene evidence, change in and out of PPE, collect trash, and serve as a break area ([Figure 1.2](#)).
- No one should take food, drinks, and tobacco products into a death scene area!

Major Scene Considerations

At major scenes where departmental, governmental, and media representatives are expected, areas for use of the media and for command briefings should be established as soon as possible.

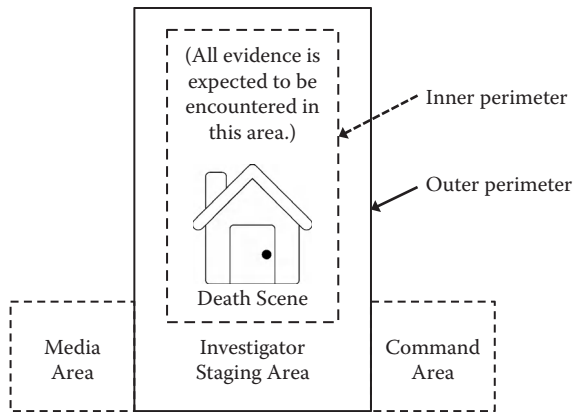


Figure 1.2

Media Area

The media will gather where you want them to be or where they want to be. The choice rests on how quickly you designate an area that provides them what they need while containing the flow of case-sensitive information.

- Designate a media area for news personnel to have access to the scene.
- This area must allow video access to the site of interest, for example showing DSIs moving in and out of the scene with equipment or the front entrance of a structure. The area should be positioned to prevent filming in critical investigative areas.
- The media area should also be removed from the command briefing area to prevent the media from hearing, capturing, or recording parts of command briefs.
- A failure to designate a media area will cause media to surround your death scene perimeter.

Command Briefings

- Designate an area for command briefings.
- This area should be outside the death scene perimeter and allow easy access for death scene supervisors to hold briefings.
- The location should also be sufficiently isolated to limit law enforcement command personnel from becoming involved in routine death scene investigation decisions and direction. This will help avoid any appearance of unusual influence over the processing procedure.

Scene Evaluation, Analysis, Strategy, and Direction

2

Death Scene Response

Initial Information

- Initial information will almost certainly be wrong or incomplete.
- Get mentally prepared. Even a seasoned homicide detective may find a scene or situation upsetting. Get yourself ready for what you are about to do. The time to get focused and oriented is *not* at a scene with witnesses, bystanders, and perhaps suspects standing around.

Arrival at Scene

- Obtain briefing from responsible party.
- Take control of scene.
- Perform initial walk-through.
- Reassess boundaries.
- Examine body.

Scene Evaluation

After establishing death scene perimeters and ensuring death scene security, the DSI in charge should take the opportunity to walk through the scene to become familiar with the evidence present and its interrelationship to the scene.

Initial Walk-Through

- The walk-through should be conducted with appropriate PPE, and paths of travel should be those least likely to have been traversed by the perpetrator or victim.
- It is appropriate to videotape, digitally record, or take general photographs during the initial walk-through. The recording may be accomplished by the death scene photographer or videographer accompanying the lead DSI on the walk-through.

- It is also appropriate to note observations of scene conditions that may have been changed inadvertently, for example doors that were opened or closed, locked or not locked, lights on or off, and other general conditions.
- If during the walk-through, an item of perishable evidence is discovered (a hair on a broken window, a footwear impression outside when inclement weather is likely, etc.), the item should be immediately safeguarded or expeditiously documented and processed.

Preliminary Examination of Deceased

Movement to Body: Point-to-Point Search

- Establish a pathway to the body.
- The established path should be least likely traveled by perpetrator or witnesses.
- Mark the path as you clear it for evidence.

Determine Death

Presumptive Determination of Death

- Does the victim appear dead?
- Do you see any indications of breathing, pulse, or reaction to stimuli?
- Is the victim's physical condition inconsistent with life? Is the body decomposed? Has the victim been decapitated?
- Has the victim been examined by responding EMS personnel?

Victim Alive, Expected to Die

- In most jurisdictions a death occurring within 365 days of the onset of injuries may lead to criminal charges.
- Death must result from inflicted injuries or as a direct result of those injuries.
- If you wait to see whether a victim will die, the scene may be altered and witnesses and evidence may disappear!

Preserving Perishable Evidence on Clothing or Body

- Bloodstains should immediately be documented photographically.
- Perishable trace and biological evidence should be collected.

Postmortem Indicators

Refer to Chapter 13 for details on postmortem indicators.

- Livor mortis: determines time since death and postmortem movement.
- Rigor mortis: determines time since death and postmortem movement.
- Algor mortis: determines time since death.

Pronouncement of Death

Determination of death by an EMS or other medical practitioner, medical examiner, coroner, justice of the peace, or other authority specified by state statute is normally made at the scene.

EMS

- Note time and authority for determination.
- If possible, do not allow body to be transported.
- Interview EMS to determine position of victim when found, condition when found, and any items EMS touched or moved.

Medical Doctor

- May pronounce death.
- May have no investigative background.
- Mind your evidence! A physician is a health care provider, not an evidence technician.

Justice of the Peace

- Typically has minimal formal death investigation training.
- Often pronounces death; suspicious deaths are usually investigated by others.

Coroner

- May pronounce death.
- May investigate and determine cause and manner of death.
- May hold inquest to determine cause and manner of death.
- May or may not be highly trained and experienced.

Identify, Secure, and Preserve Primary Scene

- Identify and secure the location where the body is discovered.
- Secure all adjacent areas that may contain evidence of the crime or death.

- Secure any area that may have been used for passage to or from the scene by the perpetrator(s).
- Ensure that entire scene is under law enforcement control and secured.
- You can always limit the size of a scene later; it is very difficult to expand a scene later.
- Secure surveillance cameras that may have captured the death or movements into or from the death scene.

Identify, Secure, and Preserve Secondary Scenes

All secondary scenes must be secured and maintained under law enforcement control. As with primary scenes, a secondary scene can be made smaller, but it is very difficult to expand an existing scene later. Secondary scenes include the places and items listed below.

- The location where the victim was killed or assaulted (if different from where body was discovered)
- Any vehicle or other conveyance used to transport the victim from the point of assault to where the body was left or hidden
- Any vehicle or conveyance that may have transported the victim under the control of the assailant prior to the killing
- Any area where the assailant may have watched the victim in anticipation of the assault
- Any area where the assailant may have left evidence of the crime such as his or her home, vehicle, or clothing
- Surveillance cameras that may have captured the death or movements into or from the death scene
- The back of the ambulance where clothing or other items of the victims may have been left
- The hospital trauma center where clothing, personal effects, and removed bullets may have been removed or stored

The Body: Primary and Secondary Scenes

Preserve Perishable Evidence

Evidence that may be lost or destroyed while awaiting sequential processing should immediately be collected or protected; for example, a hair on a broken glass window or a footwear impression outside a window when a storm is expected.

- Are there bloodstains on the body or clothing that will be altered if not immediately documented and preserved?
- Is there gunshot residue or other trace evidence on the body that will be altered or obscured if not immediately documented and preserved?
- Are there hairs or fibers on the body that will be lost if not immediately documented and preserved?
- Is there any other physical evidence on or immediately associated with the body that is transient in nature and will be lost if not immediately documented and preserved?

Note Scene Indicators

- What does the scene tell you in relation to the preliminary statements?
- Are there disconnects or contradictions that would make this death appear suspicious?

Documentation of Injury

- Without moving or disturbing the body, document any obvious injuries or indications of injuries (defects in clothing).
- Document photographically the palms of the hands and soles of the feet (or footwear) if possible without disturbing the body.

Documentation of Postmortem Indicators

Appendix I is a postmortem indicators worksheet included as an aid for documenting postmortem observations at a scene.

- Without moving the body, record the development of livor mortis. Is it consistent with the position in which the body was discovered?
- Without moving the body, record the development of rigor mortis. Is it consistent with the position in which the body was discovered?
- Without moving the body, record the state of algor mortis using the method authorized by the medical examiner.

Investigative Plan and Scene Strategy

At the conclusion of the walk-through, an investigative strategy for processing the scene should be developed. This is an opportunity to *slow down* and determine investigative priorities, tasking, and assignments. The videotape or photos from the walk-through may be helpful for planning and strategy purposes. After a strategy is developed, it should remain sufficiently flexible to allow for unforeseen developments.

Scene Considerations

- Consider tasks at hand and manpower available and make appropriate assignments.
- Consider any unique equipment requirements such as auxiliary lighting, side scanning sonar, or safety equipment.
- Consider the need for support through specialists such as explosive ordnance disposal, underwater evidence, computer forensics, fire cause and origin, and search and recovery experts.
- Consider unique weather or terrain requirements such as an area on a steep grade or unstable ground that may require rope work, a tidal area, or a busy roadway requiring traffic control.

Order of Processing

- Observe without disturbing anything.
- Record details via notes, photography, and sketches.
- Process and preserve physical evidence; ensure that friction ridges of fingerprints, as well as biological and trace evidence are properly protected.
- Collect and properly package evidence and enter it into the evidence custody system.

Investigative Plan

Determine Whether Death is Suspicious

- Some deaths by their nature are immediately categorized as suspicious and require appropriate investigation. Examples are suicides, homicides, and deaths in police custody.
- Other may appear completely consistent with a natural or accidental death.
- Use of a death investigation decision tree ([Figure 2.1](#)) will greatly assist in determining initial investigative direction and the recognition of subtle scene indicators. A tree will always move an investigator toward a more conservative approach when the appropriate strategy may be in doubt.

Prioritizing Actions Note: It will almost always be necessary to clear a path for expedited approach to a body.

- Considering scene indicators, determine whether environmental or other conditions require prioritization of evidence.

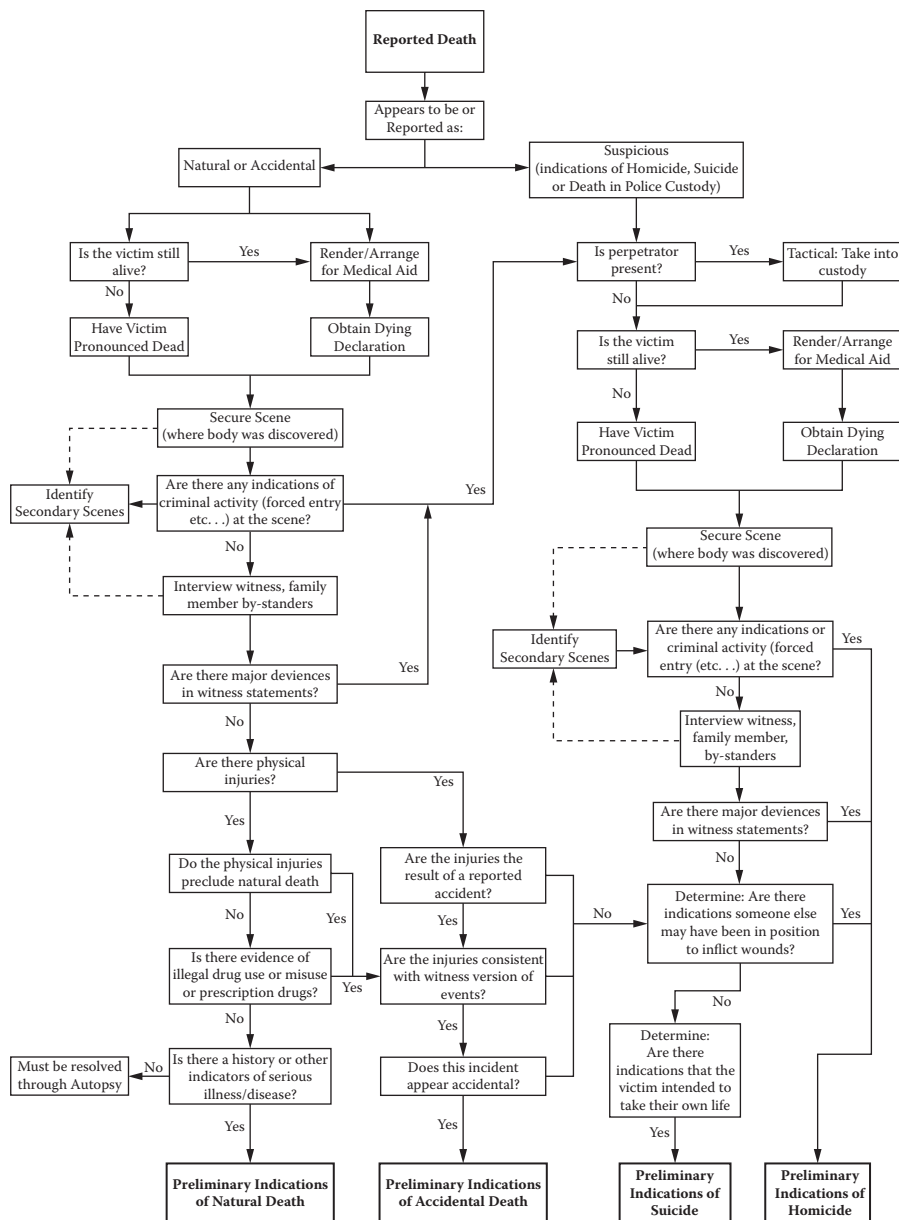


Figure 2.1 Death investigation decision tree.

- Determine what remaining perishable evidence requires priority processing.
- Identify any evidence that must be processed and moved to facilitate movement in the scene.
- Decide whether it is necessary to implement a point-to-point search to clear evidence, reach and obtain perishable evidence, or clear a path to the body. Any point-to-point search should minimize disturbance of the paths of travel of victim and suspects, as well as other evidence.

Determine Investigative Direction

Determining direction is the initial approach to an investigation based on an analysis of the scene indicators. This analysis is preliminarily accomplished by applying a death investigation decision tree. Additional scene indicators are constantly analyzed in the context of both the tree and the scene details. An investigator must remain sufficiently flexible to alter the investigative direction when indicated by scene indicators and additional information developed through the investigation at large. Refer to the following chapters for more detailed information about types of deaths:

The following considerations and activities are listed in an order conducive to efficiently processing a death scene. Individual circumstances may dictate a different order. This procedure should be used when a death investigation decision tree (see Figure 2.1) indicates a preliminary investigative direction for natural death.

Definition of Natural Death

A natural death results from a diagnosed disease or medical condition from which the expected outcome is death.

Legal Considerations

- Determine your legal authority to be present and to conduct a death scene investigation.
- Be cautious of initial exigent circumstances that allowed first responders into the scene. After lifesaving measures are no longer needed and a search for victims and possible perpetrators have been completed, your right to be there under exigent circumstances may no longer exist.
- There is no “death scene exception” to the Fourth Amendment to the U.S. Constitution. You must have permission or a search warrant, or be in an area where no one has a reasonable expectation of privacy.
- A permissive search authorization from the owner of the property (or owner and tenant if a legal rental agreement is in place) will often suffice and should be secured in writing.
- A search warrant, although the most time-consuming permission to obtain, is by far the most secure type of authorization and the least likely to be successfully challenged in court.

- Remember, a seemingly natural or accidental death may later be determined a homicide. Ensure that the evidence you find and conditions you document will be available in a criminal court of law if required.

Death Scene Interviews

First Responders

- Who reported the death? How and to whom was it reported? Review and, if appropriate, obtain copies or transcripts of notification calls to public safety agencies (i.e., 911 calls in the U.S.).
- Who discovered the body and under what circumstances? What triggered the discovery?
- Where and when was the body found?
- How was the body positioned? Was it moved or altered in any way?
- When was the last time the person was seen alive? What was he or she doing?
- Was the victim infected with a contagious disease such as hepatitis, HIV, etc.?
- How did the responders (police, EMS, etc.) gain access to the scene?
- What were the circumstances surrounding the death?

Family Members

- Was the decedent treated for any known medical conditions or diseases?
- Was the decedent diagnosed with an illness or disease that was expected to be fatal?
- Was the death unexpected?
- Who is the decedent's physician and how would can he or she be contacted?
- Was the decedent taking prescribed medications? Obtain a list.

Decedent's Physician

- Was the decedent treated for a disease or illness expected to lead to death?
- Is there any reason we should believe his or her death was not natural?

- Will you sign a death certificate or coordinate with the local medical examiner to issue a death certificate citing a natural death?
- Are all of the medications found consistent with the decedent's treatment plan?

Scene Considerations

Although a death may initially appear natural, the circumstances as ascertained through a thorough and complete investigation may indicate that the cause was an accident, suicide, or homicide. Examples include suicide by over-medication, accidental death due to unintentional over-medication, and physician- or medical professional-assisted suicide.

- The medical examiner or coroner who has jurisdiction for the body should be notified as soon as possible. The intent is to inform authorities of the investigation and coordinate any on-scene responses, not request removal of the body.
- Except to protect fragile evidence from potential destruction, there is no need to rush the processing of a death scene without first establishing a plan.
- If the body has already been removed to a medical facility or funeral home, an investigator must respond to the receiving facility to gather physical evidence and process the body.

Recovery of Human Remains

- Section II provides specific guidance on search techniques.
- If the remains are in an inaccessible area or have yet to be located, it will be necessary to search for and recover them (Chapter 9).
- Surface recovery is covered in Chapter 10.
- Recovery of buried remains is discussed in Chapter 11.
- Recovery of remains from water is covered in Chapter 12.

Initial Approach and Contact with Body

Initial Approach

- Determine a path of approach that is least likely to disturb evidence.
- At a minimum wear gloves, mask, and footwear coverings.

- Rapidly conduct a point-to-point search along the determined path while marking and safeguarding physical evidence.

Preliminary Determination of Death

If not already established, determine that the decedent is in fact dead and does not require emergency medical care. Some physical signs indicating that death is presumed (until legal determination) are:

- Absence of pulse and respiration
- Fixed and dilated pupils that are unresponsive to light
- No signs that indicate cardio-pulmonary resuscitation (CPR) is required
- Obvious injury inconsistent with life such as decapitation, traumatic head injury with evacuation of brain content, massive blood loss, body cut in two or more pieces, and obvious decomposition

Documentation, Preservation, and/or Collection of Perishable Evidence

- Photograph discrete bloodstain patterns on the victim's clothing or adjacent to the body before they are obscured by further blood flow.
- Hairs and fibers on the victim's clothing or body may be lost through air movement or exposure to the elements.
- Foreign fluids or stains (such as semen) on the body may be obscured by blood flow.

Post Mortem Indicators

Chapter 13 details postmortem interval issues. Appendix I is a postmortem indicators worksheet.

Livor mortis — Purplish discoloration in dependent areas (those areas closest to the ground):

- Is livor mortis present?
- Is its location consistent with the body position?
- Is the livor mortis fixed or fluid?

Rigor mortis — Stiffening of muscles and joints:

- Is rigor mortis present?
- Is it consistent with the body position?

- Is it partially or fully developed in all muscles and joints of the body?
- If partially developed, are there indications that it is developing or dissipating?

Algor mortis — Reduction in body temperature:

- Is the body warm or cool to the touch?
- Record body temperature via method authorized by medical examiner.
 - Digital thermal scan of forehead
 - Digital thermal scan of tympanic membrane (eardrum)
 - Digital or mercury thermometer temperature of armpit
 - Temperature of liver (invasive procedure to be used only by properly trained practitioners and authorized by medical examiner)
- Record ambient temperature at elevation of body.
- Record temperature of surface on which body rests.
- Repeat all recordings hourly until the body is removed from the scene.

Note: Further processing should be held in abeyance until all physical evidence around the body and in a clear path leading to the body has been documented, preserved, and collected.

Death Scene Processing

Death scenes are often highly complex and require skilled care and methodical processing. There is no requirement to have a body removed immediately from a scene, and removal may be detrimental if it occurs before a scene is thoroughly examined for evidence. The steps are detailed below.

Take Control of Scene

- Start documentation of the scene via notes, sketching, and photography. Documentation is an ongoing process.
- Extend death scene perimeter if necessary. Consider media presence and ranges of lenses.
- Establish log of all persons entering or exiting death scene.
- Establish a command post outside the death scene perimeter.

Conduct Initial Scene Walk-Through

- Use protective booties, gloves, and mask at a minimum. Full PPE may be appropriate (see Appendix A). Chapter 2 discusses scene evaluation and strategy.
- Establish investigator paths of entry and exit separate from those used by possible suspected perpetrators.
- Document and safeguard perishable evidence.

Legal Determination of Death

- If not already accomplished, have the body pronounced dead.

Plan Development

- Consider the use of a video walk-through for briefings.
- Evaluate results of walk-through.
- Evaluate available assets.
- Determine whether additional or specialized personnel are required, for example, a medical examiner, sexual assault response team, explosive ordnance disposal (EOD), forensic anthropologist, or SCUBA divers.
- Determine whether additional or specialized equipment is required, for example, lighting, ladders, evidence collection supplies, metal detectors, etc.
- Formulate a processing plan.

Conduct Team Briefing

A team briefing is only one aspect of death scene management. See Chapter 29 for a detailed discussion.

- Assign duties to team members.
- Ensure team members understand their roles.
- Explain the level of biological hazard and PPE required for personnel entering a scene or specific parts of a scene (see Appendix A).
- Provide a thorough briefing of death scene details to all team members. Discuss the evidence expected to be encountered.
- For specific evidence and indicators associated with various types of death (gunshot wounds, hangings, stabbings, etc.), see the

appropriate chapter in Section III. If any of these injury types are present, the case should not be treated as a natural death. Return to the death investigation decision tree (Figure 2.1) and re-evaluate your strategy.

Scene Processing

- Overall photography of the scene may be the next step. The photographer must avoid likely paths of travel by the perpetrators and physical evidence still at the scene.
- Examine and process the paths of entry, exit, and the area of the incident for two- and three-dimensional footwear and/or tire impressions (Chapter 40). Avoid areas containing biological evidence.
- Document all lighting, heating, and security conditions at the scene and note other scene markers that may indicate times of activities.
- If forced entry is evident, the case may not be a natural death. Return to the death investigation decision tree (Figure 2.1) and reevaluate the scene.
- Process for biological and trace evidence (Chapters 37 and 38).
- Locations of all medical debris should be documented.
- Document bloodstain patterns (Chapter 34).
- Note any items that may relate to motive or intent.
- Seize and protect all writing paper and tablets. They may be examined later for latent prints and indented writing and subjected to handwriting analysis.
- Note and seize any indicators of despondency or anger (torn photos, letters, items of symbolic or sentimental value, etc.). If these items are present, the case may not be a natural death. Return to the death investigation decision tree (Figure 2.1) and reevaluate the scene.
- Secure all video, audio, digital, computer, and other media for determination of possible motive for the death.
- Consider which items of evidence may require special handling, processing, or preservation to safeguard friction ridges on fingerprints, latent prints, or other evidence (Section VI).
- Search for, examine, and recover all weapons or possible instruments of death. If such items are present, the case may not be a natural death. Return to the death investigation decision tree (Figure 2.1) and reevaluate the scene.

Documenting Scene Indicators

- Note any indicators of activity of the decedent prior to death, for example, meal preparation, telephone calls (note time made and to whom), computer and Internet activities, etc.
- Note any indications of planning for activities that would have occurred after death, for example, food thawing or in preparation, alarm set, appointments, etc.

Identifying Secondary Death Scenes

- Areas where medications or other indicators of natural disease or terminal medical condition are kept.
- Medical records indicating that the deceased had a natural disease or terminal medical condition.

Processing Body

The medical examiner, coroner, or their representatives may wish to be present at the scene during the processing of the body or to conduct examinations. For specific signs of physical trauma and evidence associated with various types of deaths (gunshots, hangings, stabbings, etc.), see the applicable chapter in Section III. Gloves and appropriate PPE should be worn during processing.

Photographing Body

The body should be photographed as it was found (prior to moving it). Detailed note taking and photography should continue during body processing. Specific areas to be photographed include:

- Face
- Head and upper torso
- Hands (detailed, all surfaces)
- Lower torso and legs
- Feet (detailed, including soles)
- Entire body
- Right and left profiles

Sketching Body

Draw the body and clearly show its position. Fix the position by triangulating (or another method of measurement if indicated) the positions of the:

- Head (nose)
- Torso (umbilicus)
- Arms (shoulder, elbow, and wrist joint)
- Legs (hip, knee, and ankle joint)

Documenting with Notes

- Fully describe the appearance of the body (sex, skin color, clothing, disarray of clothing, jewelry, etc.).
- Fully document obvious injuries, decomposition changes (Chapter 13), insect activity (Chapter 36), presence of blood, and state of coagulation (Chapter 34), open or closed eyes, etc.
- Continue postmortem indicator data collection using worksheet (Appendix I).
- Note apparent activity at time of death such as sleeping, eating, bathing, etc.
- If blood is present at the scene, note its presence or absence on the hands, feet, and soles of the shoes. Fully document all bloodstain patterns on and near the victim (Chapter 34).

Examination of Body

- Examine the clothing for evidence of struggle or damage caused by weapons. If signs of struggle are present, reevaluate using death investigation tree.
- Examine the clothing, body, and immediate surrounding area for trace evidence. Consider the use of an ultraviolet (UV) light or alternate light source (ALS), as detailed in Chapters 37 and 38.
- Examine and empty pockets that are accessible without moving the body. The contents of pockets should be documented and placed in separate containers and labeled as to pocket location.
- Roll the body onto a clean sheet and examine the clothing and pockets on the underside.
- The body, wrapped in the sheet should be placed in a body bag in the original position in which it was found, if practical.

- The body bag should be sealed with a tamper-proof device. If the security of the body in transit is questionable, it should be escorted to the place where the autopsy will take place.
- After removal of the body, the area from which the body was removed should be thoroughly examined for additional evidence and trace evidence.

Outdoor Death Scenes

- Consider using clean tarps or similar devices to shield bodies from onlookers while the scene is processed.
- If needed for expediency in adverse weather conditions, a body may be covered by a clean tarp or sheet that should be collected later because it may contain trace evidence.
- Take soil samples beneath and around the body (Chapter 38).
- Sift the soil beneath the body for evidence.
- Collect appropriate entomological evidence (Chapter 36).

Common Indicators of Natural Death

- Prescription and other medicines
- Medical alert bracelet or pendant
- Indications of medical care or treatment
- Names of treating physicians and contact information

Related Searches

- Medicine cabinets
- Kitchen cabinets (for medicines)
- Nightstand (for medicines)
- Refrigerator (for medicines)
- Medical records
- Medical insurance documentation
- Disease-related literature

Accidental Deaths

4

The following considerations and activities are listed in an order conducive to efficiently processing a death scene. Individual circumstances may dictate a different order. This procedure should be used when a death investigation decision tree (see Figure 2.1) indicates a preliminary investigative direction for accidental death.

Definition of Accidental Death

An accidental death results from an act or activity whose outcome is *not* expected to be fatal.

Legal Considerations

- Determine your legal authority to be present and to conduct a death scene investigation.
- Be cautious of initial exigent circumstances that allowed first responders into the scene. After lifesaving measures are no longer needed, a search for victims and possible perpetrators should be completed. Your right to be there under exigent circumstances may no longer exist.
- There is no “death scene exception” to the Fourth Amendment to the U.S. Constitution. You must have permission, or a search warrant, or be in an area where no one has a reasonable expectation of privacy.
- A permissive search authorization from the owner of the property (or owner and tenant if a legal rental agreement is in place) will often suffice and should be secured in writing.
- A search warrant, although the most time-consuming permission to obtain, is by far the most secure type of authorization and the least likely to be successfully challenged in court.

- Remember, a seemingly accidental death may later be determined a homicide. Ensure that the evidence you find and conditions you document will be available in a criminal court of law if required.

Death Scene Interviews

First Responders

- Who reported the death? How and to whom was it reported? Review and, if appropriate, obtain a copies or transcripts of notification calls to public safety agencies (i.e., 911 calls in the U.S.).
- Who discovered the body and under what circumstances was it discovered? What triggered the discovery?
- Where and when was the body found?
- How was the body positioned? Was it moved or altered in any way?
- When was the last time the person was seen alive? What was he or she doing?
- Was the victim infected with a contagious disease such as hepatitis, HIV, etc.?
- How did the responders (police, EMS, etc.) gain access to the scene?
- What were the circumstances surrounding death?

Witnesses

- What did you observe happen?
- What was the deceased doing just prior to the accident?
- Did you observe anything unusual in the activities of the deceased right before or at the time of the accident?
- Did you observe anything unusual in the activities of those around the deceased right before or at the time of the accident?
- Did the equipment or gear used by the deceased at the time of the accident appear to be working properly?
- Do you have any reason to believe the death was not an accident? What is that reason?

Gunshot Residue (GSR) Examination and Collection

- When was the last time you handled a firearm?
- When was the last time you fired a weapon?
- When was the last time you were present when a weapon was fired? What was your proximity to the weapon?
- When was the last time you washed your hands?
- Are you right- or left-handed?

Scene Considerations

Although a death may initially appear accidental, the circumstances as ascertained through a thorough and complete investigation may indicate that the cause was natural or it was a suicide or homicide. Examples include a suicide staged to look like an accident, a homicide staged to look like an accident, or an accident secondary to natural death (victim had a heart attack, collapsed, car veered off the road and into an embankment).

- Caution must be exercised when responding to all accidental deaths because the conditions that precipitated the accident may still exist.
- The medical examiner or coroner who has jurisdiction for the body should be notified as soon as possible. The intent is to inform authorities of the investigation and coordinate any on-scene responses, not request removal of the body.
- Except to protect fragile evidence from potential destruction, there is no need to rush the processing of a death scene without first establishing a plan.
- If the body has already been removed to a medical facility or funeral home, an investigator must respond to the receiving facility to gather physical evidence and process the body.

Recovery of Human Remains

- Section II provides specific guidance on search techniques.
- If the remains are in an inaccessible area or have yet to be located, it will be necessary to search and recover them (Chapter 9).
- Surface recovery is covered in Chapter 10.
- Recovery of buried remains is discussed in Chapter 11.
- Recovery of remains from water is covered in Chapter 12.

Initial Approach and Contact with Body

Initial Approach

- Determine a path of approach that is least likely to disturb evidence.
- At a minimum wear gloves, mask, and footwear coverings.
- Rapidly conduct a point-to-point search along the determined path while marking and safeguarding physical evidence.

Preliminary Determination of Death

If not already established, determine that the decedent is in fact dead and does not require emergency medical care. Some physical signs indicating that death is presumed (until legal determination) are:

- Lack of pulse and respiration
- Fixed and dilated pupils that are unresponsive to light
- No signs that indicate cardio-pulmonary resuscitation (CPR) is required
- Obvious injury inconsistent with life such as decapitation, traumatic head injury with evacuation of brain content, massive blood loss, body cut in two or more pieces, and obvious decomposition.

Documentation, Preservation, and/or Collection of Perishable Evidence

- Photograph discrete bloodstain patterns on the victim's clothing or adjacent to the body before they are obscured by further blood flow.
- Hairs and fibers on the victim's clothing or body may be lost through air movement or exposure to the elements.
- Foreign fluids or stains (such as semen) on the body may be obscured by blood flow.

Post Mortem Indicators

Chapter 13 details postmortem interval issues. Appendix I is a postmortem indicators worksheet.

Livor mortis — Purplish discoloration in dependent areas:

- Is livor mortis present?
- If so, is its location consistent with the body position?
- Is the livor mortis fixed or fluid?

Rigor mortis — Stiffening of muscles and joints:

- Is rigor mortis present?
- Is it consistent with the body position?
- Is it partially or fully developed in all muscles and joints of the body?
- If partially developed, are there indications that it is developing or dissipating?

Algor mortis — Reduction in body temperature:

- Is the body warm or cool to the touch?
- Record body temperature via method authorized by medical examiner.
 - Digital thermal scan of forehead
 - Digital thermal scan of tympanic membrane (eardrum)
 - Digital or mercury thermometer temperature of armpit
 - Temperature of liver (invasive procedure to be used only by properly trained practitioners and authorized by medical examiner)
- Record ambient temperature at elevation of body.
- Record temperature of surface on which body rests.
- Repeat all recordings hourly until the body is removed from the scene.

Note: Further processing should be held in abeyance until all physical evidence around the body and in a clear path leading to the body has been documented, preserved, and collected.

Death Scene Processing

Death scenes are often highly complex and require skilled care and methodical processing. There is no requirement to have a body removed immediately from a scene, and removal may be detrimental if it occurs before a scene is thoroughly examined for evidence. The steps are detailed below.

Take Control of Scene

- Start documentation of the scene via notes, sketching, and photography. Documentation is an ongoing process.
- Extend death scene perimeter if necessary. Consider media presence and ranges of lenses.
- Establish log of all persons entering or exiting death scene.
- Establish a command post outside the death scene perimeter.

Conduct Initial Scene Walk-Through

- Use protective booties, gloves, and mask at a minimum. Full PPE may be appropriate (Appendix A). Chapter 2 discusses scene evaluation and strategy.
- Establish investigator paths of entry and exit separate from those used by suspected perpetrators.
- Document and safeguard perishable evidence.

Legal Determination of Death

- If not already accomplished, have the body pronounced dead by the proper legal authority.
- Consider the use of a video walk-through for briefings.

Plan Development

- Evaluate results of walk-through.
- Evaluate available assets.
- Determine whether additional or specialized personnel are required, for example, a medical examiner, sexual assault response team, explosive ordnance disposal (EOD), forensic anthropologist, and SCUBA divers.
- Determine whether additional or specialized equipment is required, for example, lighting, ladders, evidence collection supplies, metal detectors, etc.
- Formulate a processing plan.

Conduct Team Briefing

A team briefing is only one aspect of death scene management. See Chapter 29 for a detailed discussion.

- Assign duties to team members.
- Ensure team members understand their roles.
- Explain the level of biological hazard and PPE required for personnel entering a scene or specific parts of a scene (see Appendix A).
- Provide a thorough briefing of death scene details to all team members. Discuss the evidence expected to be encountered.
- For specific evidence and indicators associated with various types of death (gunshot wounds, hangings, stabbings, etc.), see the appropriate chapter in Section III. If any of these injury types are present, the case should not be treated as a natural death. Return to the death investigation decision tree (Figure 2.1) and re-evaluate your strategy.

Scene Processing

- Overall photography of the scene may be the next step. The photographer must avoid likely paths of travel by possible perpetrators and any physical evidence still at the scene.

- Examine and process the paths of entry, exit, and the area of the incident for two- and three-dimensional footwear and/or tire impressions (Chapter 40). Avoid areas containing biological evidence.
- Document all lighting, heating, and security conditions at the scene and note other scene markers that may indicate times of activities.
- If forced entry is indicated, the case should not be treated as a natural death. Return to the death investigation decision tree (Figure 2.1) and reevaluate the scene.
- Process for biological and trace evidence (Chapters 37 and 38).
- Locations of all medical debris should be documented.
- Document bloodstain patterns (Chapter 34).
- Note any items that may relate to motive or intent.
- Seize and protect all writing paper and tablets. They may be examined later for latent prints and indented writing and subjected to handwriting analysis.
- Note and seize any indicators of despondency or anger (torn photos, letters, items of symbolic or sentimental value, etc.). If these items are present, the case should not be treated as a natural death. Return to the death investigation decision tree (Figure 2.1) and reevaluate the scene.
- Secure all video, audio, digital, computer, and other media for determination of possible motive for the death.
- Consider which items of evidence may require special handling, processing, or preservation to safeguard friction ridges on fingerprints, latent prints, or other evidence (Chapter 39).
- Search for, examine, and recover any weapons or possible instruments of death. If such items are present, the case should not be treated as a natural death. Return to the death investigation decision tree (Figure 2.1) and reevaluate the scene.
- If a weapon was likely used and cannot be found, conduct an expanded search of the area focusing on the likely path of retreat. In particular, investigate dumpsters, bodies of water, and roofs of buildings.
- Search for, examine, and recover items associated with a weapon such as casings and bullets.
- Search for, examine, and recover other items that may link a suspect to the crime and/or death scene.

Documenting Scene Indicators

- Note any indicators of activity of the decedent prior to death, for example, meal preparation, telephone calls (note time made and to whom), computer and Internet activities, etc.

- Note any indicators of industrial, sporting, or other activity that may have led to the accident that caused the death, for example, ladders, tools, parachutes.
- Note any indications of planning for activities that would have occurred after death, for example, food thawing or in preparation, alarm set, appointments etc.

Identifying Secondary Death Scenes

- Area of the accident and all equipment associated with the accident.
- Additional secondary scenes may be the locations of equipment storage and maintenance and maintenance logs for equipment associated with the accident.

Processing Body

The medical examiner, coroner, or their representatives may wish to be present at the scene during the processing of the body or to conduct examinations. For specific signs of physical trauma and evidence associated with various types of death (gunshots, hangings, stabbings, etc.), see the applicable chapter in Section III. Gloves and appropriate PPE gear should be worn during processing.

Photographing Body

The body should be photographed as it was found (prior to moving it). Specific areas to be photographed include:

- Orientation and spatial relationship between the body and equipment whose use or failure may have led to the accident
- Face
- Head and upper torso
- Hands (detailed, all surfaces)
- Lower torso and legs
- Feet (detailed, including soles)
- Entire body
- Right and left profiles
- Continuous note taking and photography during body processing

Sketching Body

Draw the body and clearly show its position. Fix the position by triangulating (or another method of measurement if indicated) the positions of the:

- Head (nose)
- Torso (umbilicus)
- Arms (shoulder, elbow, and wrist joint)
- Legs (hip, knee, and ankle joint)
- Note distances and relationship to equipment near the body that may have led to the accident.

Documenting with Notes

- Fully describe the appearance of the body (sex, skin color, clothing, disarray of clothing, jewelry, etc.).
- Fully document any obvious injuries, decomposition changes (Chapter 13), insect activity (Chapter 36), presence of blood, and state of coagulation (Chapter 34), open or closed eyes, etc.
- Continue postmortem indicator data collection (Appendix I).
- Note apparent activity at time of death such as sleeping, eating, bathing, etc.
- If blood is present at the scene, note its presence or absence on the hands, feet, and soles of the shoes. Fully document all bloodstain patterns on and near the victim (Chapter 34).

Examination of Body

- Examine victim's clothing for evidence of struggle or damage caused by weapons.
- If restraints (ropes, belts, tape, clothing) were used to bind the victim, do not move or remove them. Knots and overlapped areas of tape should not be cut through or untied. There are rare in accidental death with the exception of Autoerotic Asphyxia, reevaluate using death investigation decision Tree.
- Place the hands in small paper bags (not plastic) and seal them with tape at the wrists. This will protect gunshot residue (GSR) and other trace evidence that may be on the hands or beneath the fingernails.
- Consider the possibility of developing latent fingerprints on the skin or sampling for touch DNA if it is believed the body was handled. (Chapter 37).
- Examine the clothing, body, and immediate surrounding area for trace evidence. Consider the use of ultraviolet (UV) light or an alternate light source (ALS) as detailed in Chapters 37 and 38.

- Examine and empty pockets that are accessible without moving the body. The contents of pockets should be placed in separate containers and labeled as to pocket location.
- Roll the body onto a clean sheet and examine the clothing and pockets on the underside.
- The body, wrapped in the sheet, should be placed in a body bag in the original position in which it was found, if practical.
- The body bag should be sealed with a tamper-proof device. If the security of the body in transit is questionable, it should be escorted to the place where the autopsy will take place.
- After removal of the body, the area from which the body was removed should be thoroughly examined for additional evidence and trace evidence.

Outdoor Death Scenes

- Consider using clean tarps or similar devices to shield body from onlookers while the scene is processed.
- If needed for expediency in adverse weather conditions, a body may be covered by a clean tarp or sheet that should be collected later because it may contain trace evidence.
- Take soil samples beneath and around body (Chapter 38).
- Sift the soil beneath the body for evidence.
- Collect appropriate entomological evidence (Chapter 36).

Evidence Commonly Associated with Accidental Deaths

- Tools and machinery
- Ladders
- Scaffolding
- Industrial equipment
- Sporting and recreational equipment
- Automobiles

Related Searches

- Equipment maintenance and repair records
- Equipment storage area
- Operator manuals for associated equipment

The following considerations and activities are listed in an order conducive to efficiently processing a death scene. Individual circumstances may dictate a different order. This procedure should be used when a death investigation decision tree (Figure 2.1) indicates a preliminary investigative direction for suicidal death.

Definition of Suicide

Suicide occurs when an individual desires to die and initiates an action that intentionally results in the loss of his or her life.

Legal Considerations

- Determine your legal authority to be present and to conduct a death scene investigation.
- Be cautious of initial exigent circumstances that allowed first responders into the scene. After lifesaving measures are no longer needed, a search for victims and possible perpetrators should be completed. Your right to be there under exigent circumstances may no longer exist.
- There is no “death scene exception” to the Fourth Amendment to the U.S. Constitution. You must have permission or a search warrant, or be in an area where no one has a reasonable expectation of privacy.
- A permissive search authorization from the owner of the property (or owner and tenant if a legal rental agreement is in place) will often suffice and should be secured in writing.
- A search warrant, though the most time-consuming permission to obtain, is by far the most secure type of authorization and the least likely to be successfully challenged in court.

Death Scene Interviews

First Responders

- Who reported the death? How and to whom was it reported? Always review and, if appropriate, obtain copies or transcripts of notification calls to public safety agencies (i.e., 911 calls in the U.S.).
- Who discovered the body and under what circumstances? What triggered the discovery?
- Where and when was the body found?
- How was the body positioned? Was it moved or altered in any way?
- When was the last time the person was seen alive? What was he or she doing?
- Was the victim infected with a contagious disease such as hepatitis or HIV, etc.?
- How did the responders (police, EMS, etc.) gain access to the scene?
- What were the circumstances surrounding death?

Gunshot Residue (GSR) Examination and Collection

- When was the last time you handled a firearm?
- When was the last time you fired a weapon?
- When was the last time you were present when a weapon was fired? What was your proximity to the weapon?
- When was the last time you washed your hands?
- Are you right- or left-handed?

Scene Considerations

Although a death may initially appear suicidal, the circumstances as ascertained through a thorough and complete investigation may indicate that the death was natural or the result of an accident or homicide.

- The medical examiner or coroner who has jurisdiction for the body should be notified as soon as possible. The intent is to inform authorities of the investigation and coordinate any on-scene responses, not request removal of the body.
- Except to protect fragile evidence from potential destruction, there is no need to rush the processing of a death scene without first establishing a plan.

- If the body has already been removed to a medical facility or funeral home, an investigator must respond to the receiving facility to gather physical evidence and process the body.

Recovery of Remains

- Section II provides specific guidance on search techniques.
- If the remains are in an inaccessible area or have yet to be located, it will be necessary to search for and recover them.
- Surface recovery is covered in Chapter 10.
- Recovery of buried remains is discussed in Chapter 11.
- Recovery of remains from water is covered in Chapter 12.

Initial Approach and Contact with Body

Initial Approach

- Determine a path of approach that is least likely to disturb evidence.
- At a minimum wear gloves, mask, and footwear coverings.
- Rapidly conduct a point-to-point search along the determined path while marking and safeguarding physical evidence.

Preliminary Determination of Death

If not already established, determine that the decedent is in fact dead and does not require emergency medical care. Some physical signs indicating that death is presumed (until legal determination) are:

- Absence of pulse and respiration
- Fixed and dilated pupils that are unresponsive to light
- No signs that cardio-pulmonary resuscitation (CPR) is required
- Obvious injury inconsistent with life such as decapitation, traumatic head injury with evacuation of brain content, massive blood loss, body cut in two or more pieces, and obvious decomposition

Documentation, Preservation, and/or Collection of Perishable Evidence

- Photograph discrete bloodstain patterns on the victim's clothing or adjacent to the body before they are obscured by further blood flow.

- Hairs or fibers on the victim's clothing or body may be lost through air movement or exposure to the elements.
- Foreign fluids or stains (such as semen) on the body may be obscured by blood flow.

Post Mortem Indicators

Chapter 13 details postmortem interval issues. Appendix I is a postmortem indicators worksheet.

Livor mortis — Purplish discoloration in dependent areas:

- Is livor mortis present?
- Is its location consistent with the body position?
- Is the livor mortis fixed or fluid?

Rigor mortis — Stiffening of muscles and joints:

- Is rigor mortis present?
- Is it consistent with the body position?
- Is it partially or fully developed in all muscles and joints of the body?
- If partially developed, are there indications that it is developing or dissipating?

Algor mortis — Reduction in body temperature:

- Is the body warm or cool to the touch?
- Record body temperature via method authorized by medical examiner.
 - Digital thermal scan of forehead
 - Digital thermal scan of tympanic membrane (eardrum)
 - Digital or mercury thermometer temperature of armpit
 - Temperature of liver (invasive procedure to be used only by properly trained practitioners and authorized by medical examiner)
- Record ambient temperature at elevation of body.
- Record temperature of surface on which body rests.
- Repeat all recordings hourly until the body is removed from the scene.

Note: Further processing should be held in abeyance until all physical evidence surrounding the body and in a clear path leading to the body has been documented, preserved, and collected.

Death Scene Processing

Death scenes are often highly complex and required skilled care and methodical processing. There is no requirement to have a body removed immediately from the scene, and removal can be detrimental if it occurs before a scene is thoroughly examined for evidence. The steps are detailed below.

Take Control of Scene

- Start documentation of the scene via notes, sketching, and photography. Documentation is an ongoing process.
- Extend death scene perimeter if necessary. Consider media presence and ranges of lenses.
- Establish log of all persons entering or exiting death scene.
- Establish a command post outside the death scene perimeter.

Conduct Initial Scene Walk-Through

- Use protective booties, gloves, and mask at a minimum. Full PPE may be appropriate (Appendix A). Chapter 2 discusses scene evaluation and strategy.
- Establish investigator paths of entry and exit separate from those used by any suspected perpetrators.
- Document and safeguard perishable evidence.

Legal Determination of Death

- If not already accomplished, have the body pronounced dead, by the proper legal authority.

Plan Development

- Evaluate results of walk-through.
- Evaluate available assets.
- Determine whether additional or specialized personnel are required, for example, a medical examiner, sexual assault response team, EOD, forensic anthropologist, or SCUBA divers.
- Determine whether additional or specialized equipment is required, for example, lighting, ladders, evidence collection supplies, metal detectors, etc.
- Formulate a processing plan.

Conduct Team Briefing

A team briefing is only one aspect of death scene management. See Chapter 29 for a detailed discussion.

- Assign duties to team members.
- Ensure team members understand their roles.
- Explain the level of biological hazard and PPE required for personnel entering a scene or specific parts of a scene (see Appendix A).
- Provide a thorough briefing of death scene details to all team members. Discuss the evidence expected to be encountered.
- For specific evidence and indicators associated with various types of death (gunshot wounds, hangings, stabbings, etc.), see the appropriate chapter in Section III. An evaluation of the injury through section III may indicate the injury could not be self-inflicted. Return to the death investigation decision tree (Figure 2.1) and reevaluate your strategy.

Scene Processing

- Overall photography of the scene may be the next step. The photographer must avoid likely paths of travel by the perpetrators and physical evidence still at the scene.
- Examine and process the paths of entry, exit, and the area of the incident for two- and three-dimensional footwear and/or tire impressions (Chapter 40). Avoid areas containing biological evidence.
- Document all lighting, heating, and security conditions at the scene and note other scene markers that may indicate times of activities.
- If forced entry is evident, the case may not be a suicide. Return to the death investigation decision tree (Figure 2.1) and reevaluate your strategy.
- Process for biological and trace evidence (Chapters 37 and 38).
- Locations of all medical debris should be documented.
- Document bloodstain patterns (Chapter 34).
- Note any items that may relate to motive or intent.
- Seize and protect all writing paper and tablets. They may be examined later for latent prints and indented writing and subjected to handwriting analysis.
- Note and seize any indicators of despondency or anger (torn photos, letters, items of symbolic or sentimental value, etc.). If such items are present, the case may not be a suicide. Return to the death investigation decision tree (Figure 2.1) and reevaluate your strategy.

- Secure all video, audio, digital, computer, and other media for determination of possible motive for the death.
- Consider which items of evidence may require special handling, processing, or preservation to safeguard any friction ridge on fingerprints, latent prints, or other evidence (Chapter 39).
- Search for, examine, and recover any weapons or possible instruments of death. If such items are present and not in a position as location to have been wielded by the victim, the case may not be a suicide. Return to the death investigation decision tree (Figure 2.1) and re-evaluate your strategy.
- If a weapon was likely used and cannot be found, conduct an expanded search of the area focusing on the likely path of retreat, particularly dumpsters, bodies of water, and roofs of buildings.
- Search for, examine, and recover items associated with the weapon such as casings and bullets.
- Search for, examine, and recover any other items that may link a suspect to a crime and/or death scene.

Documenting Scene Indicators

- Note any indicators of activity of the decedent prior to death, for example, meal preparation, telephone calls (note time made and to whom), computer and Internet activities, etc.
- Note any indicators of industrial, sporting, or other activity that may have led to an accidental death, for example, ladders, tools, parachutes, etc.
- Note any indications of planning for activities that would have occurred after death, for example, food thawing or in preparation, alarm set, appointments, etc.

Identifying Secondary Death Scenes

- The primary death scene is the body of the deceased.
- Secondary death scenes may include the area where the instrument of death was stored and areas where written notes or electronic data may exist.

Processing Body

The medical examiner, coroner, or their representative may wish to be present at the scene during the processing of the body, or to conduct examinations. For

specific signs of physical trauma and evidence associated with various types of death (gunshot wounds, hangings, stabbings, etc.), see the applicable chapter in Section III. Gloves and appropriate PPE gear should be worn during processing.

Photographing Body

The body should be photographed as it was found (prior to moving it). Detailed note taking and photography should continue during body processing. Specific areas to be photographed include:

- Orientation and spatial relationship between the body and equipment whose use or failure may have had a role in the suicide, for example, a vehicle.
- Face
- Head and upper torso
- Hands (detailed, all surfaces)
- Lower torso and legs
- Feet (detailed, including soles)
- Entire body
- Right and left profiles

Sketching Body

Draw the body and clearly show its position. Fix the position by triangulating (or another method of measurement if indicated) the positions of the:

- Head (nose)
- Torso (umbilicus)
- Arms (shoulder, elbow, and wrist joint)
- Legs (hip, knee, and ankle joint)
- Distances and relationship of body to equipment in the immediate vicinity of the body that may have played a role in the death.

Documenting with Notes

- Fully describe the appearance of the body (sex, skin color, and clothing, disarray of clothing, jewelry, etc).
- Fully document obvious injuries, decomposition changes (Chapter 13), insect activity (Chapter 36), presence of blood, and state of coagulation, open or closed eyes, etc.

- Continue postmortem indicator data collection using worksheet (Appendix I).
- Note the apparent activity at time of death such as sleeping, eating, bathing, etc.
- If blood is present at the scene, note the presence or absence of blood on the hands, feet, and soles of the shoes. Fully document all blood-stain patterns on and near the victim (Chapter 34).

Examination of Body

- Examine the clothing for evidence of struggle or damage caused by weapons. If signs of a struggle are present, reevaluate using the death investigation decision tree.
- If restraints were used (ropes, belts, tape, clothing, etc.) to bind the victim, do not remove them. Knots and overlapped areas of tape should not be cut through or untied. If signs of a struggle are present, reevaluate using the death investigation decision tree.
- Place the hands in small paper (not plastic) bags and seal them with tape at the wrists. This will protect gunshot residue (GSR) and other trace evidence that may be on the hands or beneath the fingernails.
- Consider the possibility of developing latent fingerprints on the skin or sampling for touch DNA if it is believed the body was handled (Chapter 37).
- Examine the clothing, body, and immediate surrounding area for trace evidence. Consider the use of ultraviolet (UV) light or an alternate light source (ALS); see Chapter 34.
- Examine and empty pockets that are accessible without moving the body. The contents of pockets should be placed in separate containers and labeled as to pocket location.
- Roll the body onto a clean sheet and examine the clothing and pockets on the underside.
- The body, wrapped in the sheet, should be placed in a body bag in the original position in which it was found, if practical.
- The body bag should be sealed with a tamper-proof device. If the security of the body in transit is questionable, it should be escorted to the place where the autopsy will take place.
- After removal of the body, the areas from which the body was removed should be thoroughly examined for additional evidence and trace evidence.

Outdoor Death Scenes

- Consider using clean tarps or similar devices to shield bodies from onlookers while the scene is processed.
- If needed for expediency in adverse weather conditions, the body may be covered by a clean tarp or sheet that should be collected later because it may contain trace evidence.
- Take soil samples beneath and around body (Chapter 38).
- Sift the soil beneath the body for evidence.
- Collect appropriate entomological evidence (Chapter 36).

Evidence Commonly Associated with Suicides

- Weapons
- Medications
- Ligatures, ropes
- Suicide note (fewer than 10% of cases)
- Evidence of arranging final affairs

Related Searches

- Computer
- Desk
- Safety deposit box

Homicidal Deaths

6

In a death investigation, the default investigative direction is always homicide. The investigation may eventually lead to the conclusion that the death was natural, accidental, or suicidal. The death investigation decision tree (Figure 2.1) will, by design, default to the more suspicious investigative direction if questions arise. If progress along the death investigation decision tree does not allow continuation down a certain decision branch, move to the homicide branch and evaluate from there.

Definition of Homicide

Homicide is an action or inaction (where action is required) that results in the death of another. Homicidal deaths may or may not be criminal.

Legal Considerations

- Determine your legal authority to be present and to conduct a death scene investigation.
- Be cautious of initial exigent circumstances that allowed first responders into the scene. After lifesaving measures are no longer needed, a search for victims and possible perpetrators should be completed. Your right to be there under exigent circumstances may no longer exist.
- There is no “death scene exception” to the Fourth Amendment to the U.S. Constitution. You must have permission or a search warrant or be in an area where no one has a reasonable expectation of privacy.
- A permissive search authorization from the owner of the property (or owner and tenant if a legal rental agreement is in place) will often suffice and should be secured in writing.
- A search warrant, although the most time-consuming permission to obtain, is by far the most secure type of search authorization and the least likely to be successfully challenged in court.

- Ensure that the evidence you find and conditions you document will be available in a criminal court of law if required.

Death Scene Interviews

First Responders

- Has the suspected perpetrator been identified? Is the suspect in custody?
- Is the scene secure?
- Has the scene been searched for other victims or suspects?
- Who reported the death? How and to whom was it reported? Review and, if appropriate, obtain copies or transcripts of notification calls to public safety agencies (i.e., 911 calls in the U.S.).
- Who discovered the body and under what circumstances? What triggered the discovery?
- Where and when was the body found?
- How was the body positioned? Was it moved or altered in any way?
- When was the last time the decedent was seen alive? What was he or she doing?
- Was the victim infected with any contagious disease such as hepatitis, HIV, etc.?
- How did the responders (police, EMS, etc.) gain access to the scene?
- What were the circumstances surrounding the death?

Witnesses

Be sure to obtain identifying and contact information for each witness before you ask the following questions.

- Who was at the scene when this incident happened?
- When did you arrive?
- How did you arrive?
- When did the others arrive?
- How did they arrive?
- What was each person at the scene doing when the incident happened?
- What were you doing when the incident happened?
- Where were you positioned when the incident happened?
- Where were others at the scene positioned when the incident happened?
- What happened?

- Where did others at the scene move as the incident happened?
- Where did they go after the incident?
- When did they leave?
- How did they leave?
- What happened to the weapon?
- What have you touched or handled in the scene?

Gunshot Residue (GSR) Examination and Collection

- When was the last time you handled a firearm?
- When was the last time you fired a weapon?
- When was the last time you were present when a weapon was fired?
What was your proximity to the weapon?
- When was the last time you washed your hands?
- Are you right- or left-handed?

Scene Considerations

- Caution must be exercised when responding to all homicide scenes. Perpetrators may still be at or near the scene. The incident may still be dynamic and there may be additional victims.
- The medical examiner or coroner who has jurisdiction for the body should be notified as soon as possible. The intent is to inform authorities of the investigation and coordinate any on-scene responses, not request removal of the body.
- Except to protect fragile evidence from potential destruction, there is no need to rush the processing of a death scene without first establishing a plan.
- If the body has already been removed to a medical facility or funeral home, an investigator must respond to the receiving facility to gather physical evidence and process the body.

Recovery of Human Remains

- Section II provides specific guidance on search techniques.
- If the remains are in an inaccessible area or have yet to be located, it will be necessary to search for and recover them (Chapter 9).
- Surface recovery is covered in Chapter 10.
- Recovery of buried remains is discussed in Chapter 11.
- Recovery of remains from water is covered in Chapter 12.

Initial Approach and Contact with Body

Initial Approach

- Determine a path of approach that is least likely to disturb evidence.
- At a minimum wear gloves, mask, and footwear coverings.
- Rapidly conduct a point-to-point search along the determined path, while marking and safeguarding physical evidence.

Preliminary Determination of Death

If not already established, determine that the decedent is in fact dead and does not require emergency medical care. Some physical signs indicating that death is presumed (until legal determination) are:

- Absence of pulse and respiration
- Fixed and dilated pupils that are unresponsive to light
- No signs that indicate cardio-pulmonary resuscitation (CPR) is required
- Obvious injury inconsistent with life such as decapitation, traumatic head injury with evacuation of brain content, massive blood loss, body cut in two or more pieces, and obvious decomposition

Documentation, Preservation, and/or Collection of Perishable Evidence

- Photograph discrete bloodstain patterns on the victim's clothing or adjacent to the body before they are obscured by further blood flow.
- Hairs and fibers on the victim's clothing or body may be lost through air movement or exposure to the elements.
- Foreign fluids or stains (such as semen) on the body may be obscured by blood flow.
- Document the relationship between the victim and any weapon in the immediate area.

Post Mortem Indicators

Chapter 13 details postmortem interval issues. Appendix I is a postmortem indicators worksheet.

Livor mortis — Purplish discoloration in dependent areas:

- Is livor mortis present?
- Is its location consistent with the body position?
- Is the livor mortis fixed or fluid?

Rigor mortis — Stiffening of muscles and joints:

- Is rigor mortis present?
- Is it consistent with the body position?
- Is it partially or fully developed in all muscles and joints of the body?
- If partially developed, are there indications that it is developing or dissipating?

Algor mortis — Reduction in body temperature:

- Is the body warm or cool to the touch?
- Record body temperature via method authorized by medical examiner.
 - Digital thermal scan of forehead
 - Digital thermal scan of tympanic membrane (eardrum)
 - Digital or mercury thermometer temperature of armpit
 - Temperature of liver (invasive procedure to be used only by properly trained practitioners and authorized by medical examiner)
- Record ambient temperature at elevation of body.
- Record temperature of surface on which body rests.
- Repeat all recordings hourly until the body is removed from the scene.

Note: Further processing should be held in abeyance until all physical evidence surrounding the body and in a clear path leading to the body has been documented, preserved, and collected.

Death Scene Processing

Homicide scenes are highly complex and require skilled care and methodical documentation and processing. There is no requirement to have a body removed immediately from a scene, and removal may be detrimental if it occurs before a scene is thoroughly examined for evidence and its relationship in the context of the scene.

Identifying Primary and Secondary Death Scenes

Primary Scene

- The body of the deceased generally constitutes the primary death scene.
- The area directly around the body or room in which it is discovered also becomes part of the primary death scene.

Secondary Scenes

- Location used by perpetrator for surveillance of victim and planning the murder
- Location where the perpetrator would have lain in wait for the victim
- Area where initial contact between suspect and victim and/or the assault occurred
- Area where the victim was killed
- Path along which the body was moved
- Vehicle or other conveyance used to transport the body
- Any area the perpetrator may have “cleaned up” after the event
- Area where perpetrator discarded weapons or other items

Take Control of Scene

- Start documentation of the scene via notes, sketching, and photography. Documentation is an ongoing process.
- Extend death scene perimeter if necessary. Consider media presence and ranges of lenses.
- Establish log of all persons entering or exiting death scene.
- Establish a command post outside the death scene perimeter.

Conduct Initial Scene Walk-Through

- Use protective booties, gloves, and mask at a minimum. Full PPE may be appropriate (see Appendix A). Chapter 2 discusses scene evaluation and strategy.
- Establish investigator paths of entry and exit separate from those used by suspected perpetrators.
- Document and safeguard perishable evidence.

Legal Determination of Death

- If not already accomplished by initial responders, have the body pronounced dead by the proper legal authority.

Plan Development

- Consider the use of a video walk-through for briefings.
- Evaluate results of walk-through.
- Evaluate available assets.

- Determine whether additional or specialized personnel are required, for example, a medical examiner, sexual assault response team, EOD, forensic anthropologist, or SCUBA divers.
- Determine whether additional or specialized equipment is required, for example, lighting, ladders, evidence collection supplies, metal detectors, etc.
- Formulate a scene plan.

Conduct Team Briefing

A team briefing is only one aspect of death scene management. See Chapter 29 for a detailed discussion.

- Assign duties to team members.
- Ensure team members understand their roles.
- Explain the level of biological hazard and PPE required for personnel entering a scene or specific parts of a scene (Appendix A).
- Provide a thorough briefing of death scene details to all team members. Discuss the evidence expected to be encountered.
- For specific evidence and indicators associated with various types of death (gunshot wounds, hangings, stabbings, etc.), see the appropriate chapter in Section III.

Scene Processing

- Overall photography of the scene may be the next step. The photographer must avoid likely paths of travel by the perpetrators and physical evidence still at the scene.
- Examine and process the paths of entry, exit, and the area of the incident for two- and three-dimensional footwear and/or tire impressions (Chapter 40). Avoid areas containing biological evidence.
- Document all lighting, heating, and security conditions at the scene and note other scene markers that may indicate times of activities.
- If forced entry was used, process appropriately for burglary and housebreaking.
- Process for biological and trace evidence (Chapters 37 and 38).
- Locations of all medical debris should be documented.
- Document bloodstain patterns (Chapter 34).
- Note any items that may relate to motive or intent.

- Seize and protect all writing paper and tablets. They may be examined later for latent prints and indented writing and subjected to handwriting analysis.
- Secure all video, audio, digital, computer, and other media for determination of possible motive for the death.
- Consider which items of evidence may require special handling, processing, or preservation to safeguard any friction ridges on fingerprints, latent prints, or other evidence (Section VI).
- Search for, examine, and recover any weapons or possible instruments of death.
- If a weapon was likely used and cannot be found, conduct an expanded search of the area focusing upon the likely path of retreat. Search dumpsters, bodies of water, roofs of neighboring structures, and other items along the suspected egress route of the perpetrator.
- Search for, examine, and recover items associated with the weapon such as casings and bullets.
- Search for, examine, and recover other items that may link a suspect to the crime and/or death scene.

Document Scene Indicators

- Note any indicators of activity of the decedent prior to death, for example, meal preparation, telephone calls (note time made and to whom), computer and Internet activities, etc.
- Note any indicators of industrial, sporting, or other activity that may have led to the death, for example, ladders, tools, parachutes.
- Note any indications of planning for activities that would have occurred after death, for example food thawing or in preparation, alarm set, appointments, etc.

Processing Body

The medical examiner, coroner, or their representative may wish to be present at the scene during the processing of the body or to conduct examination. For specific signs of physical trauma and evidence associated with various types of death (gunshot wounds, hangings, stabbings, etc.), see the appropriate chapter in Section III. Gloves and appropriate PPE gear should be worn.

Photographing Body

The body should be photographed as it was found (prior to moving it). Detailed note taking and photography should continue throughout processing. Specific areas to be photographed include:

- Orientation and spatial relationship between the body and the scene, weapons, and any instruments of death that may be present
- Face
- Head and upper torso
- Hands (detailed, all surfaces)
- Lower torso and legs
- Feet (detailed, including soles)
- Entire body
- Right and left profiles
- Close-up shots of relationships of wounds and damage to clothing indicative of injury. Use the mapping technique (Figure 6.1) to depict clothing damage.

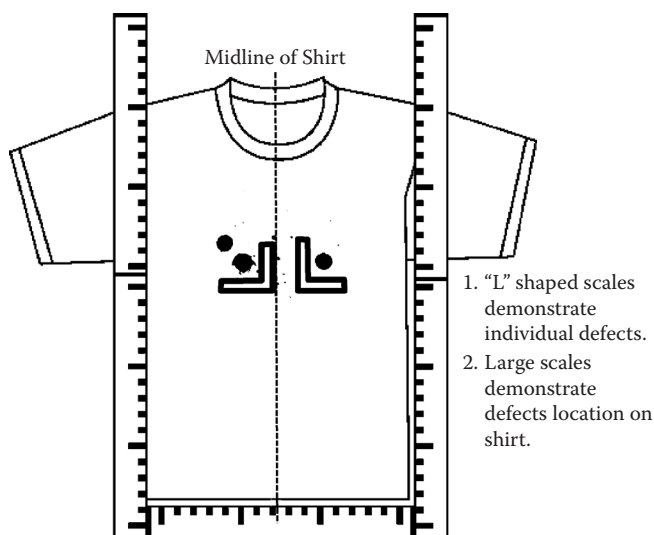


Figure 6.1 Mapping clothing damage.

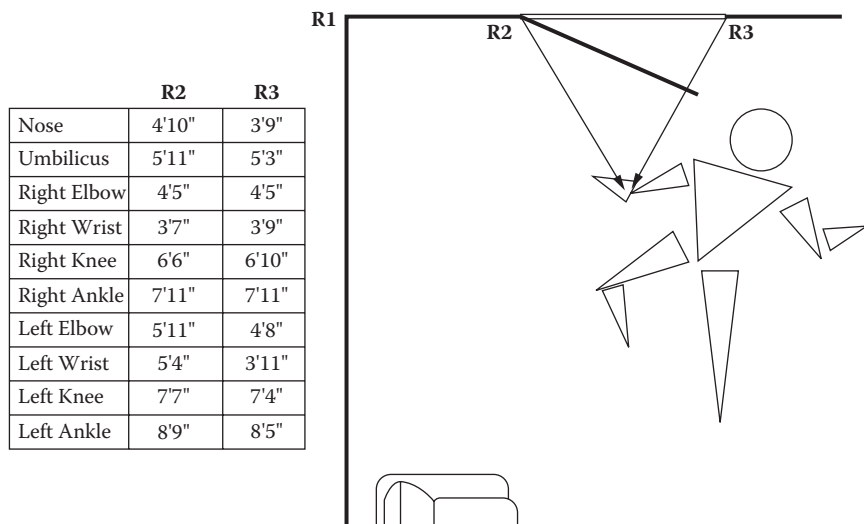


Figure 6.2 Sketching body.

Sketching Body

Draw the body and clearly show its position (Figure 6.2). Fix the position by triangulating (or another method of measurement if indicated) the positions of the:

- Head (nose)
- Torso (umbilicus)
- Arms (shoulder, elbow, and wrist joint)
- Legs (hip, knee, and ankle joint)
- Note distances and relationships to any equipment in the immediate vicinity of the body that may have played a role in the death.

Documenting with Notes

- Fully describe the appearance of the body (sex, skin color, clothing, disarray of clothing, jewelry, etc.).
- Fully document obvious injuries, decomposition changes (Chapter 13), insect activity (Chapter 36), presence of blood, and state of coagulation (Chapter 34), open or closed eyes, etc.
- Continue postmortem indicator data collection (Appendix I).
- Note apparent activity at time of death such as sleeping, eating, bathing, etc.

- If blood is present at the scene, note its presence or absence on the hands, feet, and soles of the shoes. Fully document all bloodstain patterns on and near the victim.
- Examine the clothing for evidence of struggle or damage caused by weapons.
- If restraints (ropes, belts, tape, clothing) were used to bind the victim, do not remove them. Knots and overlapped areas of tape should not be cut through or untied.
- If authorized and indicated collect GSR from victim's hands.
- Place the hands in small paper (not plastic) bags and seal them with tape at the wrists. This will protect GSR and other trace evidence that may be on the hands or beneath the fingernails.
- Consider the possibility of developing latent fingerprints on the skin or sampling for touch DNA if it is believed the body was handled (Chapter 37).
- Examine the clothing, body, and immediate surrounding area for trace evidence. Consider the use of ultraviolet (UV) light or an alternate light source (ALS); see Chapter 37).
- Examine and empty pockets that are accessible without moving the body. The contents of pockets should be placed in separate containers and labeled as to pocket location.

Examination of Body

- Examine the clothing for evidence of struggle or damage caused by weapons.
- Examine the clothing, body, and immediate surrounding area for trace evidence. Consider the use of ultraviolet (UV) light or an alternate light source (ALS); see Chapter 37).
- Examine and empty pockets that are accessible without moving the body. The contents of pockets should be documented and placed in separate containers and labeled as to pocket location.
- Roll the body onto a clean sheet and examine the clothing and pockets on the underside.
- The body, wrapped in the sheet, should be placed in a body bag in the original position in which it was found, if practical.
- The body bag should be sealed with a tamper-proof device. If the security of the body in transit is questionable, it, should be escorted to the place where the autopsy will take place.
- The area beneath where the body lay should be thoroughly examined for additional evidence and trace evidence.

Outdoor Death Scenes

- Consider using clean tarps or similar devices to shield body from onlookers while the scene is processed.
- If needed for expediency in adverse weather conditions, the body may be directly covered by a clean tarp or sheet that should be collected later because it may contain trace evidence.
- Take soil samples beneath and around body (Chapter 38).
- Sift the soil beneath the body for evidence.
- Collect appropriate entomological evidence (Chapter 36).

Evidence Commonly Associated with Homicidal Deaths

- Weapons
- Bloodstain pattern evidence
- Gunshot residue
- Ropes and ligatures
- Friction ridge evidence
- Biological and trace evidence
- Impression evidence

Related Searches

- Paths of access and egress used by the perpetrator
- All secondary crime scenes

The Role of Medical Examiner

7

Autopsies are generally conducted under the auspices of a medical examiner (ME) or coroner who has jurisdiction where the body was found. A medical examiner is a medical doctor, usually a pathologist, and preferably a board-certified forensic pathologist. Board certification as a forensic pathologist requires a minimum of 11 years of specialized medical training after earning a four-year college degree. MEs are masters of their craft. A coroner is an elected official who may or may not have investigative training.

An autopsy conducted by a trained forensic pathologist is critical for establishing cause and manner of death and also to place injuries within the context of a scene and investigation. Although the death scene investigator (DSI) is charged with investigating the scene of death, the ME usually exercises control of the body and determines the cause and manner of death.

The ME documents and collects physical evidence from the body, determines wound dynamics and mechanisms of injury, and provides vital information that may be used to reconstruct the scene. The DSI's documentation, notes and observations at the scene help the ME identify the victim, determine the cause and manner of death, and detail the mechanisms of the fatal injuries and dynamics of that event. That information travels full circle back to the DSI who integrates it into the context of the scene to develop investigative directions and identify those responsible for the death. The ME should:

- Legally pronounce the victim deceased, if this has not already been done.
- Establish legal identity of the victim.
- Conduct an autopsy.
- Establish the legal cause and manner of death based on information from the scene and results of autopsy.
- Establish approximate time since death using information from the scene and the results of autopsy.

Establishing Cause of Death

The cause of death is the underlying injury or illness that starts the cascade of events leading to demise. Examples are gunshot wounds, stab wounds, blunt force trauma, myocardial infarction (heart attack), cerebrovascular accident (CVA or stroke), and several other possibilities. Cardiac and respiratory arrests are conditions that *define* death; they are *not* causes of death.

Establishing Manner of Death

Manner of death describes one of four circumstances that result in death: natural cause, accident, suicide, or homicide. A manner of death may also be categorized as undetermined.

Natural — Result of natural process of a disease whose expected outcome is death.

Accident — Result of activity or action that is not intended or expected to lead to death.

Suicide — The taking of one's own life through deliberate action with the intent to die.

Homicide — The taking of another's life by an action or inaction (if action is required); may or may not be a criminal act.

Non-criminal homicides may include justifiable situations such as self-defense, war, and law enforcement killings. *Criminal* homicides range from negligent homicide to manslaughter to murder.

Undetermined — This classification may be temporary or long term. It is used when information about the nature of death is insufficient, for example:

- Determination awaiting toxicology results.
- Bones recovered show no indications of trauma.
- Manner of death cannot be medically determined.

Death Scene

Scene Considerations

- Considerations vary widely based on local ME requirements.
- Know the capabilities of ME personnel in your area. Are they trained and skilled medico-legal investigators or simply transportation providers?
- Under certain circumstances, the ME may choose to respond to a scene and examine the body in situ (in its original position).

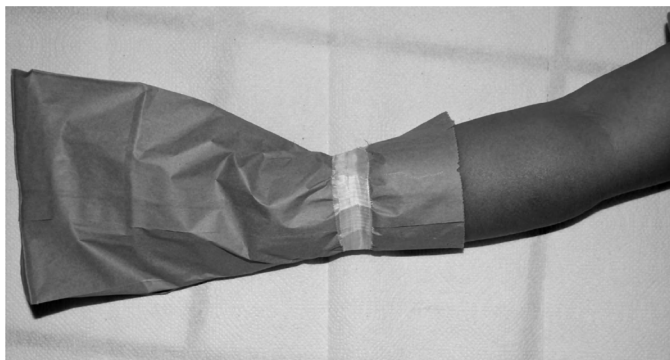


Figure 7.1 Bagging hands at scene.

On-Scene Body Processing Procedures

- Certain on-scene body processing steps *require* the ME's permission. The permission may be a blanket authorization or a special authorization for a unique situation.
- The clothing of a victim is usually removed at autopsy. In special circumstances such as possible obliteration of critical bloodstain spatters, the ME should be contacted.
- Gunshot residue (GSR) testing should be arranged immediately for anyone believed to have handled a firearm including the victim. Do not wait for the victim's arrival at the morgue. With the ME's permission, the victim's hands should be thoroughly documented by photography and the GSR kit used as non-intrusively as possible. The hands should be bagged before the body is moved from the scene (Figure 7.1).
- The most accurate method of recording body temperature at a scene is taking the temperature of the liver. This requires making a small incision with a scalpel about 0.5 cm below the rib margin of the right side of the body and inserting a thermometer through the incision and into the liver (Figure 7.2).

Circumstances Requiring Autopsy

The conduct of an autopsy is covered thoroughly in Chapter 8. An autopsy is warranted when:

- Circumstances of death suggest a crime, suicide, or other act requiring investigation.
- Death is medically unattended.

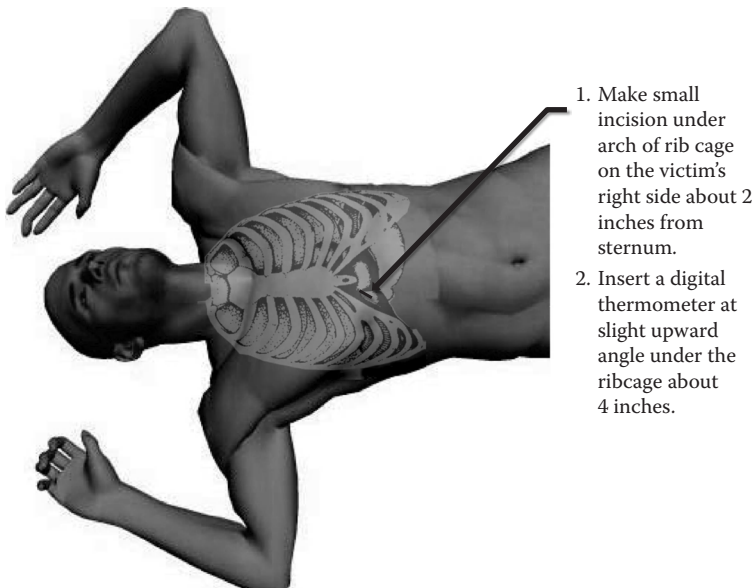


Figure 7.2 Location of incision for determining liver temperature.

- The cause of death may constitute a menace to public health.
- A physician is unable to establish the cause of death.
- The decedent was in law enforcement custody at the time of death.

Procedures in Lieu of Autopsy

If an autopsy will not be required, ensure that needed evidence and documentation are still collected. In some circumstances, this limited analysis and collection of evidence from the body constitutes an “inspection” and may entail:

- Documenting all injuries.
- Swabbing for gunshot residue.
- Taking fingerprints.
- Taking x-rays.
- Collecting blood and urine samples at hospital or funeral home.
- A virtual autopsy may be performed using computerized tomography (CT) and magnetic resonance imaging (MRI) to demonstrate wound tracks, depths of injuries, and impacts on various internal organs. This procedure is completely non-invasive.

Reports and Reporting

Outbrief

The outbrief is an opportunity to confirm opinions the ME may have voiced during the autopsy. This is the time to request copies of photographs and be listed to receive the preliminary and final autopsy reports. Request a copy of the diagram the ME used to indicate external injuries. Ask specific questions about the ME's opinions.

Preliminary Autopsy Report

The preliminary report is usually issued within a week of the autopsy and confirms findings discussed at the outbrief. The preliminary report may provide justification for the issue of warrants to search for weapons and other forensic evidence that may be associated with an identified perpetrator.

Toxicology Report

Toxicology testing and reporting may take several weeks. The report will detail levels of alcohol, drugs, or poisons found in fluids collected from the body.

Final Autopsy Report

The final report will mirror the preliminary autopsy report along with additional forensic testing results based on the toxicology report.

Autopsy Protocol and Investigator's Role

8

The autopsy suite and the body constitute the absolute domain of a medical examiner (ME). The ME usually has at least one assistant who is commonly called a diener (German for *servant*, a traditional term used in autopsy protocols). A diener is responsible for handling, moving, and cleaning the corpse and assisting with the autopsy. The ME may also employ a medical photographer to document the autopsy and significant findings. The ME is a medical doctor, usually a pathologist, and in the most desirable circumstances a board-certified forensic pathologist. Board certification in forensic pathology requires a minimum of 11 years of specialized medical training, after earning a four-year college degree. Recognizing this expertise will go a long way toward cementing a long-term working relationship with an ME.

- Establish a relationship with your local ME and staff *before* you need them for an investigation.
- Request training and to attend an autopsy or two to become familiar with ME policies and procedures.
- During an autopsy, get as close to the evidence (the body) as the ME allows and demonstrate your willingness to learn.
- Arrive early. The body may be out of the bag, undressed, rinsed, and waiting for the pathologist by the announced autopsy time.

Circumstances Requiring Autopsy

- A death case suggests a crime, suicide, or other act requiring investigation.
- A death is medically unattended.
- The cause of death may constitute a menace to public health.
- A physician is unable to establish cause of death.
- The decedent was in law enforcement custody at the time of death.

Procedures in Lieu of Autopsy

If an autopsy is not going to be conducted, ensure that needed evidence and documentation are still collected. In some circumstances, this limited analysis and collection of evidence from the body may constitute an “inspection” and may entail:

- Externally documenting all injuries.
- Swabbing for gunshot residue.
- Taking fingerprints.
- Taking x-rays.
- Collecting blood and urine samples at hospital or funeral home.
- A virtual autopsy may be performed using computerized tomography (CT) and magnetic resonance imaging (MRI) to demonstrate wound tracks, depths of injuries, and impacts on other internal organs. This procedure is completely non-invasive.

Investigator's Responsibilities at Autopsy

Equipment Required

- Camera gear with off-camera flash capability, flash, and close-up lenses or attachments
- Postmortem fingerprint kit
- Gunshot residue kit, if applicable
- Sexual assault kit, if applicable
- Evidence collection and packaging supplies
- Medical and/or dental records of decedent
- PPE (Tyvek suit, gloves, etc.) if not provided

Arrival

It is incumbent upon a DSI to represent the scene at the autopsy. Arrive early.

- Be prepared to brief the ME about the death scene using photographs or video. Make any special autopsy requests suggested by conditions at the scene.
- Draw the ME into the investigative process beyond examination of the body.
- Discuss any particular needs that may be resolved by autopsy, for example, ask which injury was most likely fatal, whether multiple

weapons were used, whether the position of the victim at the time of injury can be determined.

- Take full advantage of PPE offered by the ME staff because certain activities require an investigator's proximity to the body during the autopsy.
- Identify the pathologist and all others present at the autopsy.
- Fully document by notes and photographs your observations and actions of ME staff during the autopsy.
- Request permission to take photographs if a forensically trained photographer is not present. Even then, back-up photography is recommended.
- Discuss need for full body and dental x-rays if needed to identify the victim. Bone surveys may be required to document prior injuries in fatal child abuse cases.
- Discuss procedure for recovery of evidence (such as bullets) from the body and custody of evidence after autopsy.

External Examination

- Note method of positive identification.
- Note and document external injuries, scars, marks, and tattoos. Ensure they are consistent with pathologist's findings.
- Take photographs of the body before removal of clothing.
- Apply ultraviolet (UV) light or alternate light source (ALS) to body and clothing to reveal trace and fiber evidence.
- Take GSR samples if appropriate before the hands are disturbed. Ensure hands are thoroughly photographed before GSR testing.
- Take fingernail scrapings and clippings, if appropriate.
- Consider latent prints on the body if the perpetrator may have handled the body. Finding these prints is a specialized technique and will require the ME's approval and a special technique to perform the procedure (chapter 39).
- Consider a "touch DNA" swab if the perpetrator is believed to have handled the body (chapter 37).
- Each layer of clothing should be photographed as it is removed.
- Personal effects should be removed, inventoried, and photographed.
- Collect the clothing as it is removed and package each item separately.
- Take entomological (insect and larva) samples if evident on body and not taken at the scene.
- Consider the use of ultraviolet (UV) light or alternate light source (ALS) to detect trace evidence, bruising, dried body fluids, and fiber evidence before and after the clothing is removed.

- Take photographs of front and back of body; take individual photographs of all scars, marks, tattoos, and injuries.
- Ask the ME to utilize a sexual assault kit if indicated. A sexual assault kit may provide standards and samples for other crimes such as aggravated assault.

Internal Examination

- Photograph all external and internal injuries and other anomalies noted by the ME.
- Ensure any severed body parts are rearticulated and photographed in place if possible.
- Consider asking the ME to use a probe to demonstrate any wound tracks present and photograph them.
- Take into custody any additional evidence removed from the body (bullets, knife blades, etc.). Close-up photography of these items is important.
- After examining and collecting trace and biological evidence (Chapters 37 and 38), consider rinsing bullets or fragments removed from the body in clean water before collection. Blood remaining on bullets or fragments may be corrosive enough to deteriorate firearm markings.

After Examination

- Obtain a good quality 10-fingerprint card from the deceased. This may be left until the end of the autopsy if evidence on the hands and wrists dictate.
- If suicide is suspected or the victim is a suspect in another crime such as a suicide–murder, take major case prints.
- Discuss preliminary autopsy findings concerning cause and manner of death with the ME. Clearly note them as preliminary findings.
- Leave a business card and ask to be notified when the final autopsy results are available. A preliminary report may be available quickly but you must also obtain a final report of an autopsy.

Autopsy Photography Guidelines

General

- The bright reflective surfaces in an autopsy suite pose unique photography conditions. Tungsten surgical lamps generally provide the

lighting. Ask that they be turned off or temporarily directed away from the photographic field before photography is started. Tungsten lights will cast a yellow tint to all photographs taken with standard daylight film or digital media if not compensated for through white balance.

- A color chart should be included as the first photograph on each series or roll of film and taken under the same lighting conditions as the remainder of the roll.

ME Photographer

- Discuss specific shots required for your investigation, such as close-ups of back spatter on hands after a self-inflicted gunshot wound.
- Discuss injury mapping technique the ME will use or suggest one. Mapping will aid subsequent use of photographs.
- Discuss how and when you will receive *all* the images. You may need to take some duplicate photographs.

Investigator

- Discuss your photography plans with ME.
- See note above regarding tungsten surgical lighting; watch white balance.
- Because of many highly reflective surfaces in autopsy suites, watch for flash hotspots and your own reflection.

Required Photographs and Documentation

- Clothed body (front and back)
- Upper half of body
- Lower half of body
- Face and neck
- Hands (palms and backs)
- Footwear (upper surfaces and soles)
- Bloodstain pattern mapping technique ([Figure 8.1](#))
- Orientation photograph of discrete bloodstain patterns on clothing
- Close-ups, with and without scale, of discrete bloodstain patterns on clothing
- Orientation photograph of damage to clothing
- Close-ups, with and without scale, of damage to clothing
- Unclothed both (front and back)
- Upper half of body
- Lower half of body

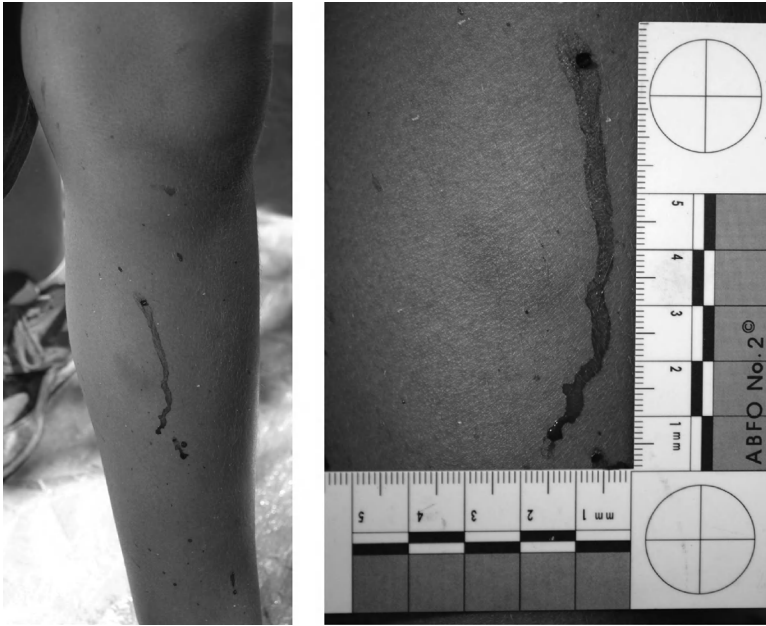


Figure 8.1 Bloodstain pattern mapping technique.

- Face and neck
- Hands (palms and backs)
- Feet (upper surfaces and soles)
- Orientation photograph of all injuries (using mapping technique)
- Mid-range photograph demonstrating wound in relation to anatomical landmark and wound clusters.
- Close-ups, with and without scale, of all injuries.
- Close-ups, with and without scale, of wound caused by sharp force

Injury Mapping

- Use standard ABFO scale. Mark the scale with the name of the deceased and wound identifier (A,B,C... or 1,2,3...) using a dry erase marker. Mark along the leg that will be used to demonstrate the sagittal plane.
- Place one leg of scale parallel with and toward the midline plane (body midline). Orient the other leg of the scale parallel with a transverse plane of the body and toward the feet ([Figure 8.2](#)).
- Use multiple scales to demonstrate wound clusters ([Figure 8.3](#)).

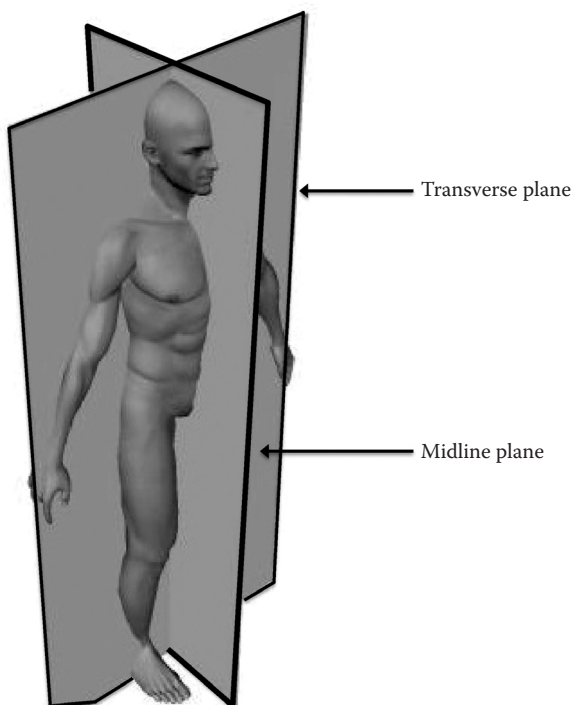


Figure 8.2 Transverse and midline body planes.

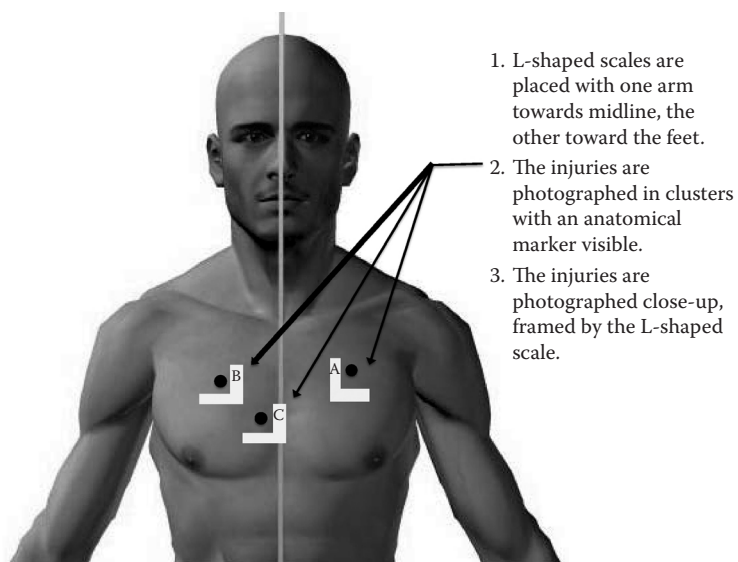


Figure 8.3 Documenting individual injuries and clusters.

- Photograph each cluster or individual wound to show its relationship to the body.
- Photograph each cluster or individual wound to show its relationship to an anatomical marker (umbilicus, nipple, ankle, nose, ear, etc.).
- Photograph each individual wound using an examination quality photograph. Fill the frame with the wound, orienting the ABFO scale to the edge of the frame (square).

Internal Examination Photographs

- Photograph any areas or organs relating to the cause and manner of death.
- Injuries to internal organs (with and without scale).
- Organs in place within body cavity.
- Organs outside body cavity against clean background.
- Wound tracks if ME considers appropriate. Multicolored fiberglass knitting needles serve as effective wound probes and are very easy to clean.
- Frame and compose photographs with minimal extraneous views of blood and internal organs. One objective may be to get a clean, detailed photograph of the injury that will be admissible in court. Excessive blood or views of the body cavity may preclude that.

Evidence Photographs

- All clothing of the deceased
- All clothing items and personal effects showing bloodstains, bullet defects, sharp force defects, or other forensic evidence (using mapping technique); see [Figure 8.4](#)
- All personal effects of the deceased
- Items of evidence removed from the body, in place if possible, and close-up

Custody of Evidence from Autopsy

- Evidence to be taken into custody must be documented on the required chain-of-custody document and properly packaged and sealed.
- Evidence items that are wet or contain biological stains may be temporarily protected by butcher paper and packaged in plastic (no more than 2 hours) until they can be properly dried.

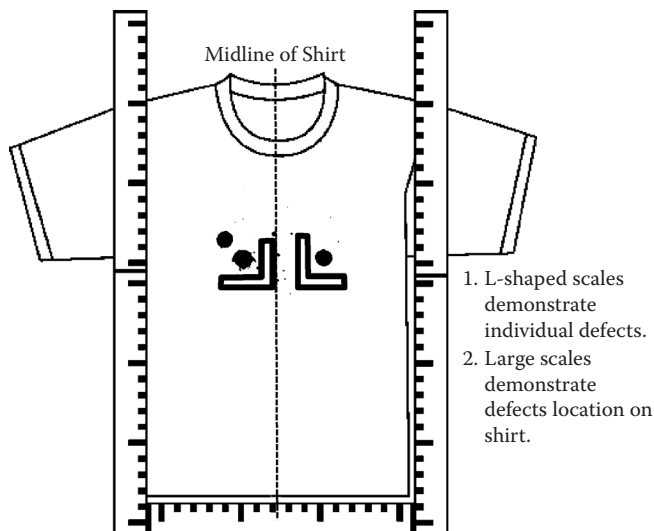


Figure 8.4 Mapping damage to clothing.

- Avoid taking custody of personal effects of the deceased that have no bearing on the investigation, for example, wedding ring, watch, wallet, jewelry. Entering them into the evidence custody system may prevent their timely return to the family or availability for interment with the deceased.

Outbrief with Medical Examiner

Discuss timeframe for receiving photographs and preliminary and final autopsy results. Ask specific questions:

- What is the preliminary determination of cause and manner of death?
- Is there anything unique about the wound dynamics to indicate whether the perpetrator was right- or left handed? Can you tell what hand the perpetrator used to wield the weapon?
- Can the wounds identify the weapon?
- If injuries are sharp, blunt, or indicate chopping, can the general type of weapon be identified. Can specific physical characteristics of the perpetrator be determined?
- If a firearm was involved, can the type of firearm and caliber or ammunition type be identified?
- Can the muzzle-to-victim distance be determined by the wound characteristics?

- Was the victim capable of purposeful movement after the injury?
- Could the victim have moved or continued to respond to the attack after injury?
- Can the victim's proximity to the suspect at the time of wounding be determined? Was the victim's back turned. Was he or she on the ground?
- Prepare other questions that may assist in identifying a perpetrator or weapon.

Recovery of Remains

II

Searching for Human Remains

9

This chapter deals with ground searches for human remains. It covers general search techniques and guidelines for searches of open ground and wooded areas. Detailed guidance for surface recoveries, buried remains, and aquatic recoveries is provided in subsequent chapters.

General Search Guidelines

- The most time-consuming search is generally the most thorough one.
- All items that may have evidentiary value should be noted.
- Items that you would expect to see and are not present should also be noted.
- The search method or pattern chosen must be methodical.
- The most logical method should adapt to the unique aspects of the search area.

Specific Search Guidelines

- For guidance on surface recoveries, refer to Chapter 10.
- For guidance on recovering buried remains, refer to Chapter 11.
- For guidance on aquatic recoveries, refer to Chapter 12.

Point-to-Point Search

- Use this technique as soon as a body is discovered to search the area between first observation and location of the body.
- Direct movement to the body while searching and clearing a path along the way.
- The path cleared should avoid the perpetrator's suspected path of travel ([Figure 9.1](#)).

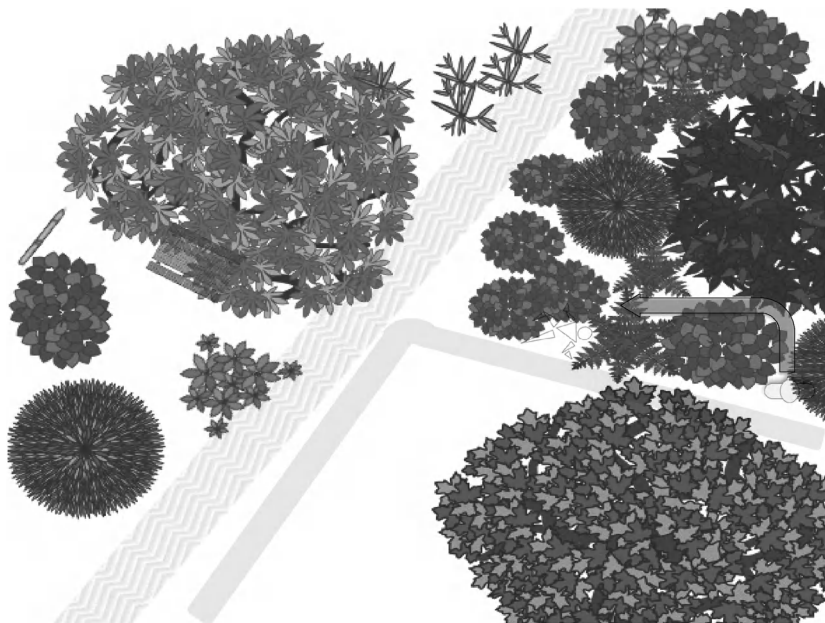


Figure 9.1 Avoid perpetrator's suspected path of travel during point-to-point search.

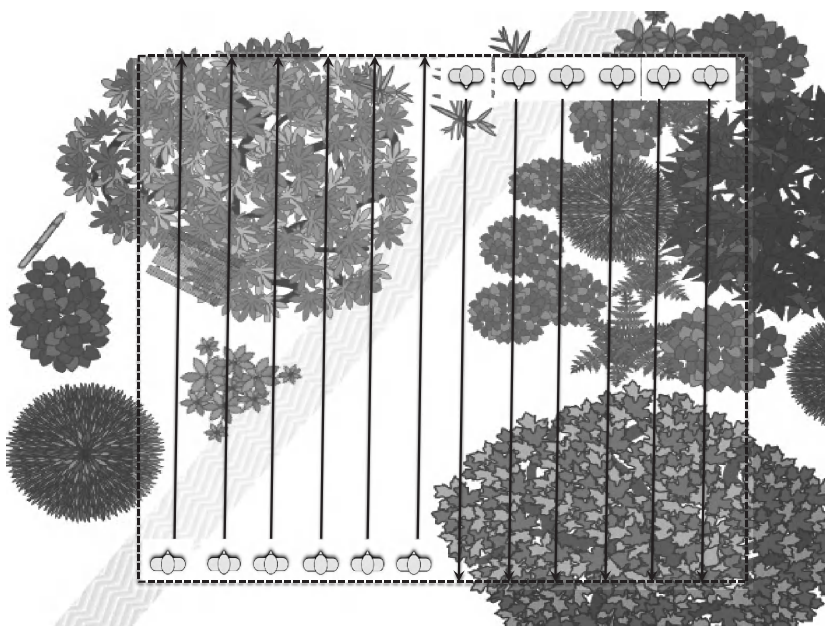


Figure 9.2 Line search.

Line Search

- A group of searchers in line and standing slightly closer than arm's width apart methodically move through the area to be searched in a straight line (Figure 9.2).
- After an initial search, it may be necessary to repeat the process on hands and knees.
- A third search may be necessary to clear the ground in front of the searchers to bare earth as they move forward.

Grid Search

- This is the most effective visual search technique.
- A line search doubles back over itself at right angles to the first search (Figure 9.3).
- The search may be repeated with an increased degree of scrutiny on each pass.

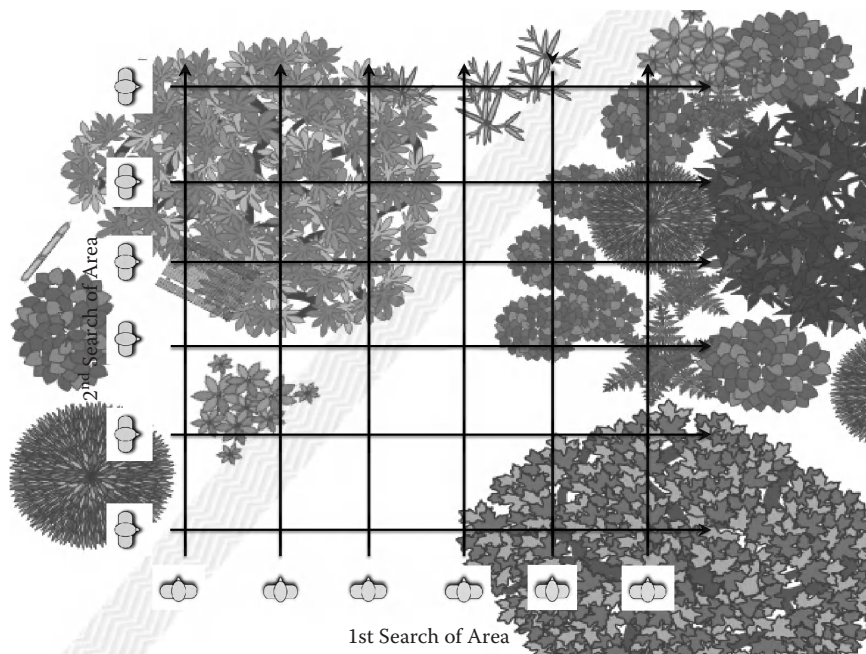


Figure 9.3 Grid search.

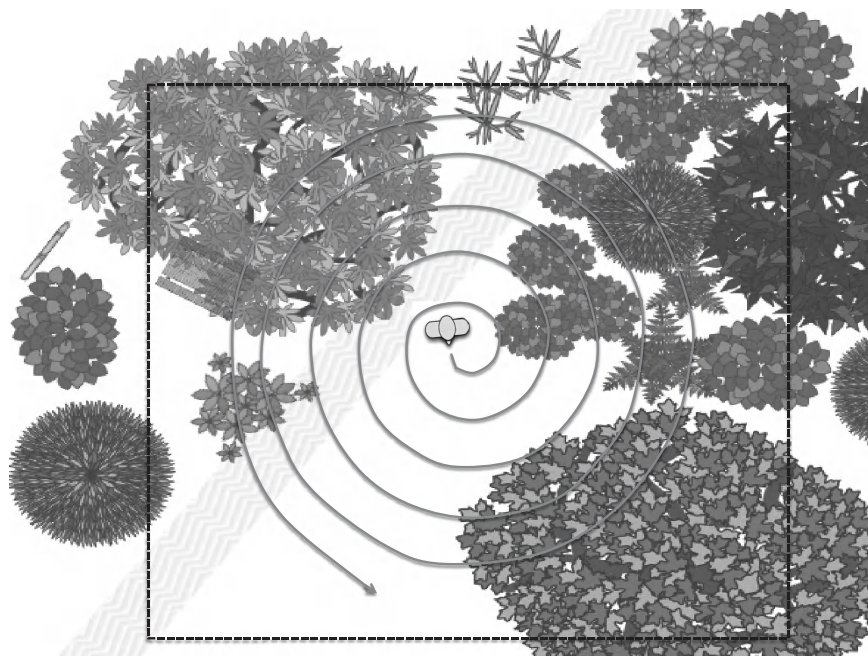


Figure 9.4 Spiral search.

Spiral Search

- The search is conducted by spiraling out from a central area of interest.
- It may be effective underwater or when moving from an area of known evidence in an unconfined space (Figure 9.4).

Surface Recovery of Human Remains

10

General

The surface recovery of human remains is a time consuming and exacting task. Rather than being confined within a grave, the body is left on the surface of the ground to decompose. This may be intentional—the result of “dumping” a body—accidental, for example, resulting from an undiscovered aircraft accident, or simply the result of a natural death in an isolated location. Usually the discovery of the body is delayed.

If decomposition is minimal, a body may remain relatively articulated and confined to a small area. Through skeletonization, animal predation, and other events, the body may become disarticulated and spread over a considerable area.

Locating Remains

Visual Techniques

- Insect and scavenger activities may aid location of a body, for example, a swarm of flies over an area or the presence of turkey vultures or other carrion eaters.
- A grid search pattern is effective for locating body parts or skeletal remains.
- Remember, the body was transported where it was found. Follow foot and vehicle paths, and concentrate on areas off the paths because it is difficult to carry a body a great distance from a trail or road.
- Remains may be scattered or concentrated based on the extent of decomposition and animal predation.
- A skull may be disassociated from its body if a canine moves it to chew or play with it. Search windfalls and other areas where a canine can protect its back while chewing.

- In parks or areas near residences, consider searching neighborhood yards, especially those where dogs are unattended and allowed to run off leash.
- Other methods will be discussed below.

Cadaver Dogs

Cadaver dogs undergo highly specialized training. They differ from search-and-rescue dogs and bloodhounds in that they are trained to detect human body decomposition, not follow living human scents.

- Cadaver dogs are trained to recognize scents from early decomposition through skeletonization.
- Cadaver dogs are effective for searching large areas for surface remains.
- When selecting a cadaver dog team, it is important to ensure proper training and review training records.

Forward Looking Infrared (FLIR) and Thermal Tomography

FLIR allows an area to be scanned to detect differences in temperature that may identify human remains. Decomposition of the body and entomological activity, particularly the presence of maggot masses, may increase the temperature of areas of the body even to the point of mid-decomposition changes. The temperature of a body during decomposition is elevated above the ambient temperature and may be detected by FLIR (often mounted on a helicopter or fixed wing aircraft) or via a portable thermography unit. This technique is most effective for surface recoveries and expedient graves.

NecroSearch International

NecroSearch International is a volunteer multidisciplinary team dedicated to assisting law enforcement to locate clandestine graves and recover evidence (including human remains) from them. Its website is www.necrosearch.com

Body Processing

- If a body is not yet skeletonized and scattered, process it based on the manner of death as described in Chapters 3 through 6.
- Ensure that entomological evidence is collected.
- Preserve impression evidence leading to or from the body location.

Scene Processing

Establishing Datum

- A site datum is a known location in three-dimensional space established to serve as a reference point for all horizontal and vertical measurements taken at the scene.
- Establish the datum at the southwest limit of a site (Figure 10.1).
- Mark the datum by driving a piece of rebar or other marker into the ground, leaving at least a foot of the material above the surface. When the site is completely measured, the rebar may be driven completely into the ground for later relocation with a metal detector.
- Fix the location of the datum with GPS coordinates or by association with fixed references.
- Mark a reference elevation height on the datum. The reference should be level with the highest ground in the search area (Figure 10.2).

Establishing Grid

- Use a compass to establish a north–south line from the datum. Stake this line at the northernmost part of the recovery area.
- Use a compass to establish an east–west line from the datum. Stake this line at the easternmost part of the recovery area.

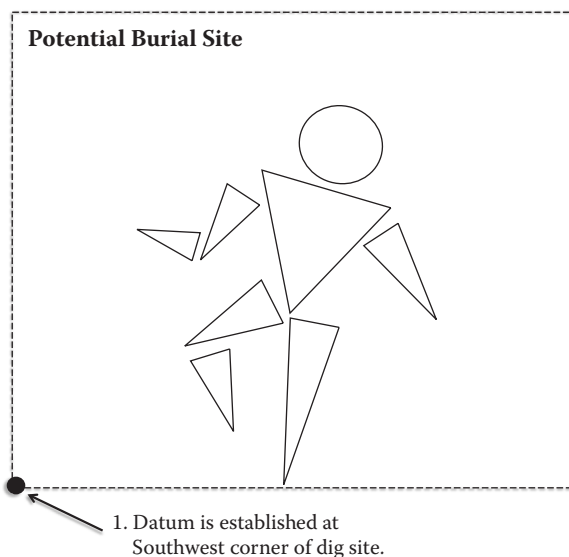


Figure 10.1 Establishing datum.

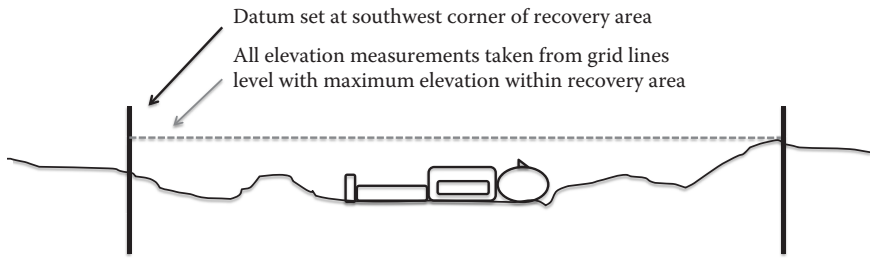


Figure 10.2 Establishing reference elevation.

- Build out the square for the grid, ensuring that all corners are 90 degrees and based on the north–south line.
- Divide the grid into logically sized squares. Squares should be large enough to allow movement within them as the evidence is recovered and documented. It is recommended that squares measure 3 feet on each side (Figure 10.3).
- When attaching the surveyor's string to the grid stakes, the string should be hung level with the initial mark on the datum indicating the highest point of ground at the site. This may be accomplished with a simple line level (Figure 10.4).
- Grid squares are identified from the datum by the number of squares north followed by the number of squares east (Figure 10.5).

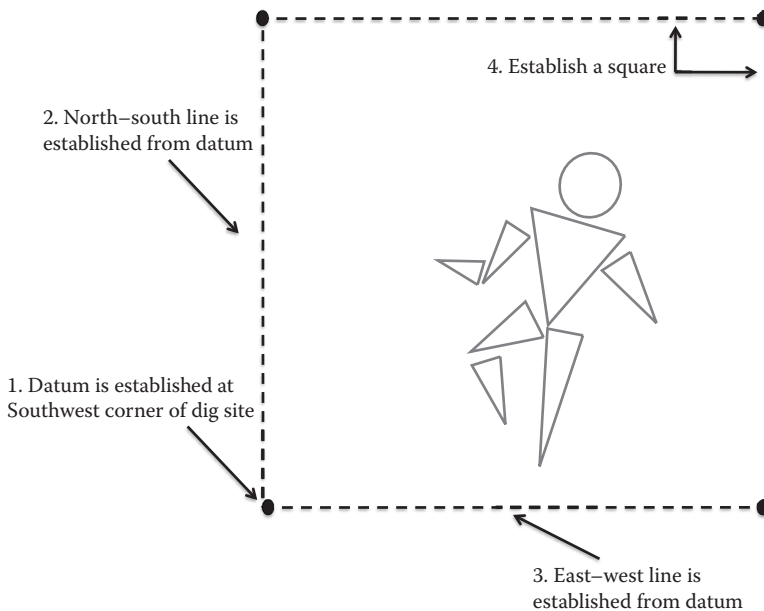


Figure 10.3 Squaring the site.

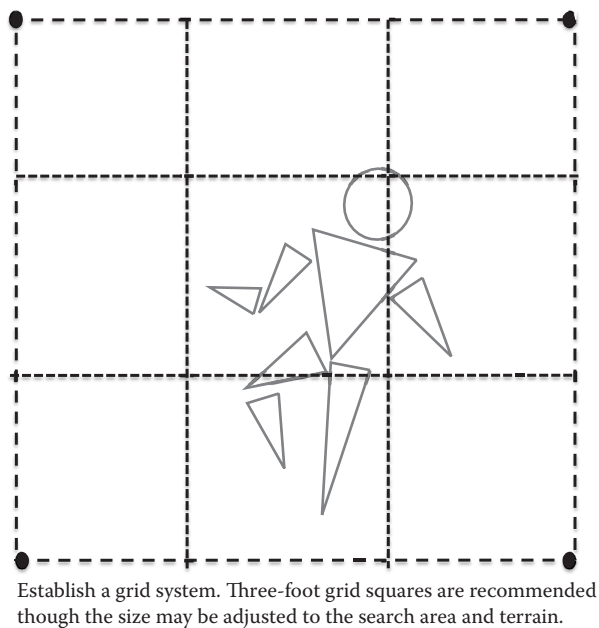


Figure 10.4 Establishing grid.

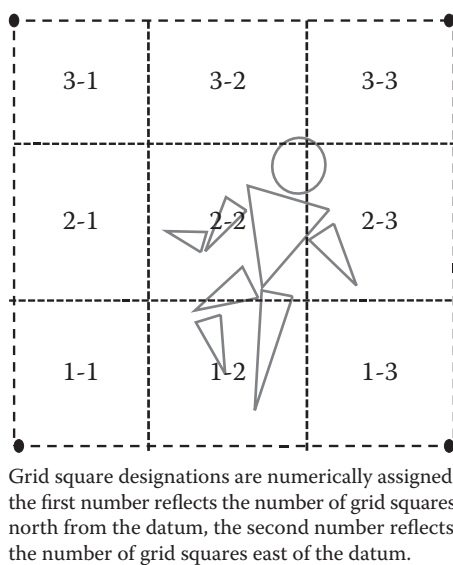


Figure 10.5 Identifying individual grid squares.

Surface Documentation and Recovery of Evidence

- Conduct a thorough surface search using the grid method if practical.
- Initial search may involve flagging and documenting all obvious remains or items of evidentiary value. Care must be taken to locate footwear and tire impressions (the body had to be moved to the site and the perpetrator had to leave it).
- Conduct a secondary search on hands and knees to flag and document any remains or items of evidentiary value not revealed during the initial standing search.
- A tertiary search on hands and knees involves removing all vegetation, clearing the ground to bare soil, and flagging and documenting remains or evidence revealed.
- Vegetation grows at predictable rates in a given area. Consider documenting plant growth and roots that have grown over the surface remains.
- A botanist familiar with the area to be searched may be able to tell you how long a surface find remained undisturbed.

Recovery of Remains

- All skeletal or body parts should be flagged.
- If a body part is found outside the central search grid, the grid may be extended (if not isolated and disassociated) or the find may be marked by GPS and/or measured by polar coordinates to the datum.
- The body part is photographed in place.
- Loose debris on top of the part should be removed.
- The body part is photographed again, without and with scale.
- The body part location is noted on the overall sketch.
- The body part should be described only in general terms (e.g., small bone fragment, long bone, flat bone, rib bone). Do not be more specific at this stage.
- Note and photograph any obvious defects. Do not attempt to differentiate animal chew marks, cut marks, skull fractures, or bullet holes at this stage. Note their presence; they will require follow-up after examination of the remains by a medical examiner or forensic anthropologist.
- Use Xs on a skeletal chart to note long bones found (scapula, pelvis, skull, and jaw). This will give you a rough idea of the major bones still missing.
- Body parts should be packaged in appropriate containers.

Sifting Soil

- Soil beneath where the body was found should be sifted. The area is easily identified by the presence of grouped vertebrae, ribs, scapula, pelvis, and other bones. Some animal predation may have disassociated bones from the grouping.
- The sifting area should be close enough to the discovery site to allow easy transport of material and communications between team members (Figure 10.6).
- Sifting should be accomplished with successively finer mesh sieves; $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ inch meshes are most often used.
- Always sift over a clean tarp. Soil should be sifted through progressively finer meshes.

Scientific Assistance

Forensic anthropologist — This expert is invaluable for examining buried remains. He or she can quickly determine the sex, approximate age, and general characteristics of a victim. These specialists may be sufficiently familiar with an area to advise about unmarked graves, historical graves, or native burial mounds. Storms, erosion, and construction may cause disinterment of these and other remains. Forensic anthropologists can advise on appropriate search methodologies. When an area containing scattered remains

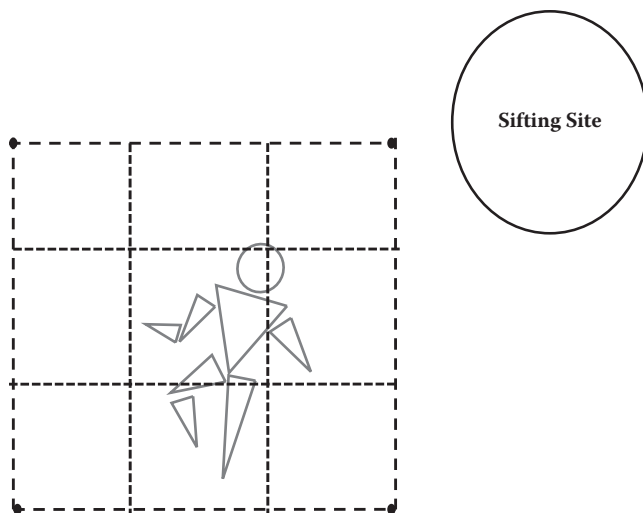


Figure 10.6 Establishing sifting site.

is located, they can expertly guide the recovery while ensuring appropriate methods and complete documentation. They can determine whether scattered remains are human or non-human.

Botanist — A botanist from a local university may be able to determine how long flora may have taken to become established within remains. For instance, a vine growing through the eye orbit of a skull that indicates 3 months of growth means the skull was completely skeletonized at least 3 months earlier. A botanist may assist in determining postmortem intervals for skeletonized remains. It is important to engage an appropriately qualified professional who can testify in court if necessary.

Ornithologist — An individual who studies birds may help recover biological evidence. Birds may have used the hair from a victim to line their nests. An ornithologist familiar with the area will be able to guide an investigator to the types of bird likely to build such nests and locate nests within the area. He or she should have appropriate qualifications and be capable of testifying in court if necessary.

Mammalogist or zoologist — Someone familiar with the behavior of small animals indigenous to the discovery site can help locate and explore small rodent holes that are excellent hiding places for rings, small bones, or other artifacts of a crime. Again, you should locate an appropriately trained professional who can appear in court if necessary.

Recovery of Buried Human Remains

11

General Principles

The location of clandestine graves and recovery of human remains are time-consuming tasks that often require specialized assistance and equipment. Buried remains may be classified as follows:

Expedient graves — Often located in natural or man-made shallow depressions and loosely covered with soil scraped from the surface. They are often hastily covered with vegetation, leaves, and limbs from the immediate area.

Shallow graves — Hastily dug shallow depressions; only inches of soil cover the remains.

Buried remains — Characterized by depth. No exact depth determines the difference between a shallow grave and a burial, but the depth and corresponding effort required to reach buried remains call for an approach different from uncovering a shallow grave. The significant digging by hand or machine required to bury the body requires similar effort by investigators.

A forensic anthropologist is an invaluable asset for investigations involving buried remains. He or she may be able to quickly determine the sex, approximate age, and general racial characteristics of a victim and advise of unmarked graves, historical graves, or native burial mounds in an area to be investigated. Forensic anthropologists can advise on appropriate search methodologies and expertly guide the recovery of remains while ensuring appropriate methods and complete documentation. They can also determine whether scattered remains are human or non-human.

Locating Remains

Visual Methods

Expedient Grave Indicators

- Insect and scavenger activities, for example, swarms of flies over an area or circling of turkey vultures or other carrion eaters at the site
- Dead or dying vegetation that was pulled to cover a grave

Shallow Grave Indicators

- Disturbed vegetation and soil
- Color change of grass or other vegetation over a grave
- Depressed area in the soil caused by decomposition of the abdomen and subsequent caving in of soil

Buried Remains Indicators

- Indications of disturbed vegetation and soil
- Mounded soil over a relatively fresh grave
- Depressed area of an older grave caused by soil settling and compaction
- Inconsistent vegetation growth

Probing Method

- A T-shaped metal or fiberglass-probing rod is used. Caution must be exercised at a shallow grave to prevent damage to the body when the rod is inserted (Figure 11.1).
- Several investigators with probing rods should stand shoulder width apart and position themselves in a line that will move forward over the suspected grave site.
- Starting well before the expected gravesite (in order to get the feel of the soil resistance) they insert the probe into the soil at the toe of their left shoe, then the center of their body, then the toe of their right shoe. They then step forward as a unit (Figure 11.2).
- They repeat this process, probing the soil as they move forward.
- When they note a change in the soil's resistance to probing (less resistance; the probe will slip into the soil more easily), they should

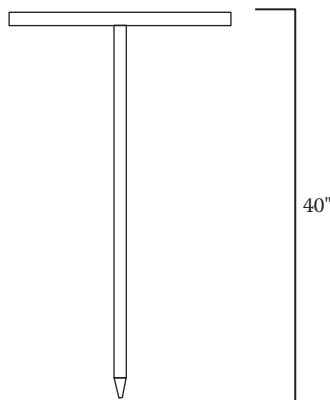


Figure 11.1 T probe.

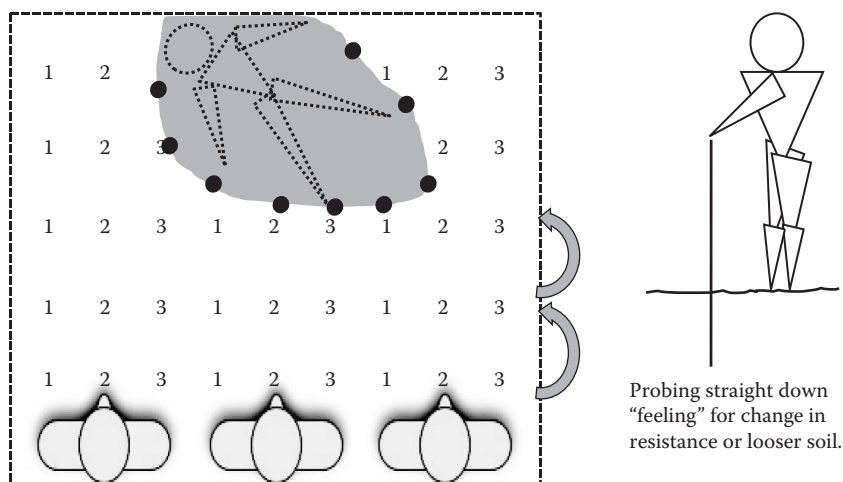


Figure 11.2 Probing technique.

stop and observe the ground features to determine whether the grave exhibits a natural outline.

- They should use the probes to gently determine the borders of the grave and use marker flags to clearly demarcate the borders until the outline of the entire grave is marked.

Cadaver Dogs

Cadaver dogs undergo highly specialized training. They differ from search-and-rescue dogs and bloodhounds in that they are trained to detect human body decomposition, not follow living human scents.

- Cadaver dogs are trained to recognize scents from early decomposition through skeletonization.
- Cadaver dogs are effective for searching for expedient, shallow, buried, or submerged remains.
- When selecting a cadaver dog team, it is important to ensure proper training and review training records.

Technological Methods

Methane gas detection — A body produces methane gas as it decomposes. In a clandestine grave, the gas is trapped beneath the ground or slowly leaches

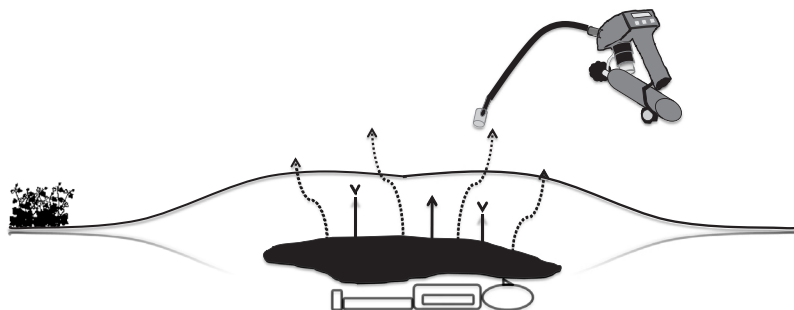


Figure 11.3 Methane gas detector.

up through the ground. The leaching gas may be located by a methane detector (Figure 11.3) used with a probing rod slipped beneath the surface at a suspected clandestine grave. Care should always be taken to avoid damaging the body by overly aggressive insertion of a probe.

Forward looking infrared (FLIR) and thermal tomography — FLIR allows an area to be scanned to detect differences in temperature that may identify human remains. Decomposition of the body and entomological activity, particularly the presence of maggot masses, may increase the temperature of areas of the body even to the point of mid-decomposition changes. The temperature of a body during decomposition is elevated above the ambient temperature and may be detected by FLIR (often mounted on a helicopter or fixed wing aircraft) or via a portable thermography unit. This technique is most effective for surface recoveries and expedient graves.

Magnetometry — A magnetometer detects the magnetic fields of buried ferrous (iron-containing) objects. While magnetometry will not detect a body in a grave, it may reveal ferrous artifacts buried with the body, for example, zippers, shoe eyelets, belt buckles, snaps, and weapons containing iron.

Electrical resistivity — As fluids from a body leach into the surrounding soil as a natural result of decomposition, they alter the ability for an electrical current to pass through the ground. A survey of the level of electrical resistance in the soil of an area suspected to contain a clandestine grave may indicate decomposition. This method is best used when late decomposition changes are present.

NecroSearch International

This voluntary multidisciplinary team is dedicated to assisting law enforcement in locating clandestine graves and recovering evidence (including human remains) from them. Its website is www.necrosearch.com

Processing Scene

Surface Documentation and Recovery of Evidence

- Conduct a thorough surface search using the grid method if practical.
- The initial search on foot involves flagging and documenting all obvious remains and items of evidentiary value. Care must be taken to locate any footwear or tire impressions (the body has to be moved to the site and the perpetrator had to leave it).
- A secondary search is conducted on hands and knees, and also flags and documents all obvious remains and items of evidentiary value.
- A tertiary search is also conducted on hands and knees. Vegetation must be removed to reveal bare soil. All obvious remains and items of evidentiary value should be flagged and documented.
- Vegetation grows at predictable rates in a given area. Consider documenting plant growth and roots encountered during excavation at a gravesite.
- A botanist familiar with the area to be searched may be able to tell you how long a grave remained undisturbed.

Surface Preparation

Establishing Datum

- A site datum is a known location in three-dimensional space established to serve as a reference point for all horizontal and vertical measurements taken at the scene.
- Establish the datum at the southwest limit of a site ([Figure 11.4](#)).
- Mark the datum by driving a piece of rebar or other marker into the ground, leaving at least a foot of the material above the surface. When the site is completely measured, the rebar may be driven completely into the ground for later relocation with a metal detector.
- Fix the location of the datum with GPS coordinates or by association with fixed references.
- Mark a reference elevation height on the datum. The reference should be level with the highest ground in the search area ([Figure 11.5](#)).

Establishing Grid

- Use a compass to establish a north–south line from the datum. Stake this line at the northernmost part of the recovery area.
- Use a compass to establish an east–west line from the datum. Stake this line at the easternmost part of the recovery area.

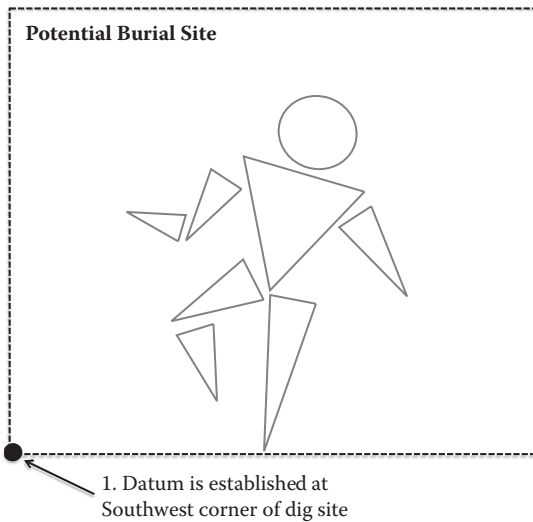


Figure 11.4 Establishing datum.

- Build out the square for the grid, ensuring that all corners are 90 degrees and based on the north-south line.
- Divide the grid into logically sized squares. Squares should be large enough to allow movement within them as the earth is excavated. It is recommended that squares at a subsurface measure 3 feet on each side ([Figure 11.6](#)).
- When attaching the surveyor's string to the stakes, the string should be hung level with the initial mark on the datum indicating the highest point of ground at the site. This may be accomplished with a simple line level ([Figure 11.7](#)).
- Grid squares are identified from the datum by the number of squares north followed by the number of squares east ([Figure 11.8](#)).

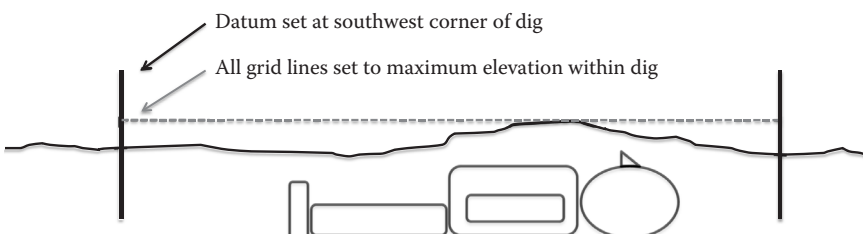


Figure 11.5 Squaring the site.

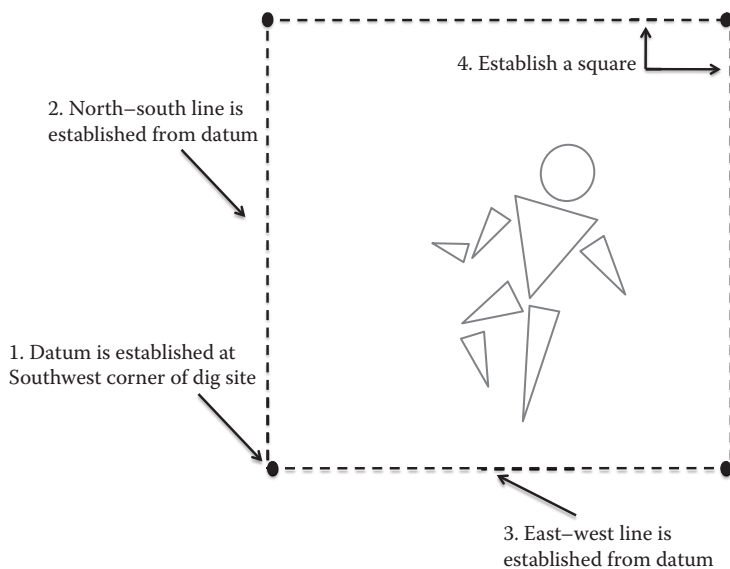


Figure 11.6 Establishing reference elevation.

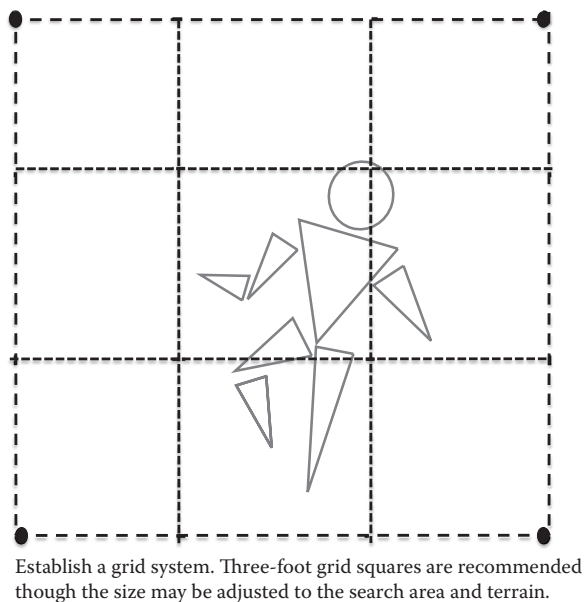
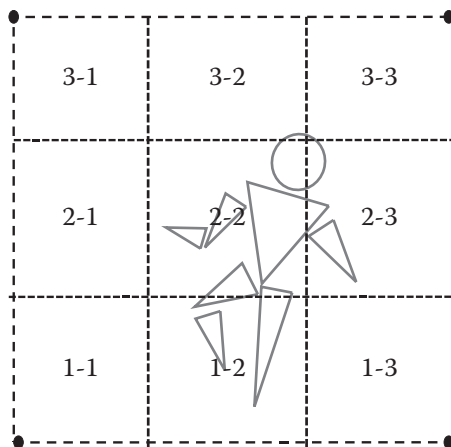


Figure 11.7 Establishing the grid.



Grid square designations are numerically assigned; the first number reflects the number of grid squares north from the datum, the second number reflects the number of grid squares east of the datum.

Figure 11.8 Identifying individual grid squares.

Preparing Sifting Site

- The sifting area should be close enough to the discovery site to allow easy transport of material and communications between team members (Figure 11.9).
- Sifting should be accomplished with successively finer mesh sieves; $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ inch meshes are most often used.
- Always sift over a clean tarp. Soil should be sifted through progressively finer meshes.

Excavating Grave

- Excavating should start only after ground search and preparation are complete. Do not rush this phase. Ensure that you have prepared the site properly and have the proper equipment and personnel to perform the excavation.
- All vegetation should have been removed during ground preparation. Soil is then removed in thin layers (no more than an inch deep) from the target grid squares. The soil should be removed using a masonry trowel, placed into a scoop, and transported for sifting.
- When troweling, keep the trowel edge at a low angle to the ground to prevent gouging the floor of the unit.

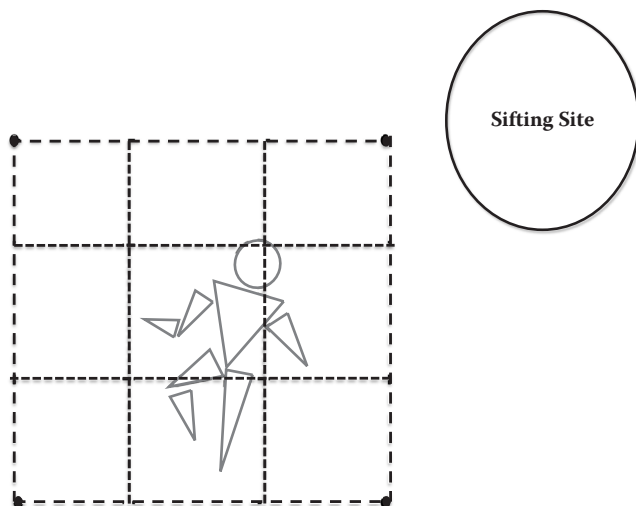


Figure 11.9 Establishing the sifting site.

- Work carefully to remove thin layers of soil to preserve natural margins or edges of the grave.
- As soon as a body part, bone, or other evidence item is discovered in a grid square, digging must stop. Photograph the item in situ. The soil around the find and additional soil from the grid square should be removed with a whisk broom and swept into a scoop.
- Reveal the bone or body part by removing the soil around it.
- As you approach the bone or other item, replace the whisk broom with a paintbrush to allow careful excavation around the item.
- The item should be maximally or fully exposed and photographed again. Measurements within the grid square and depth of the recovery as measured from the datum point should be recorded (Figure 11.10).
- The find area should be extended into adjacent grid squares. Follow the procedure of completely excavating to one depth across the find area before excavating deeper.
- Additional finds should be photographed and documented as well. Their spatial relationships to other finds should be clearly shown and documented.
- When it becomes necessary to remove a bone or other item, it may be helpful to place it on a Tyvek suit that has been spread out next to the excavation. This is a very effective way to allow anyone with even a rudimentary understanding of anatomy to see what body parts and items have been recovered and which ones have not been found (Figure 11.11).

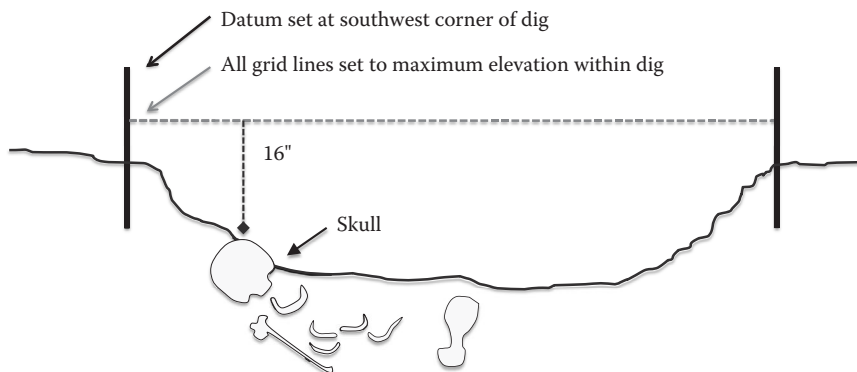


Figure 11.10 Documenting depth of recovery.

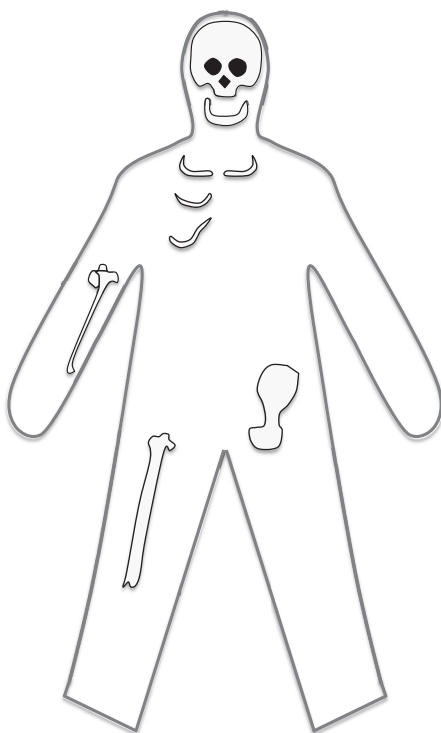


Figure 11.11 Rough inventory of recovery.

Sifting Soil

- All sifted excavated material must be identified by its grid square.
- Material is placed in the sieve and shaken until only refuse remains. The refuse is examined for evidentiary value.
- The process is repeated using progressively smaller mesh sieves.
- All items of evidentiary value are documented and associated with the grid square and depth from which the excavated material came.

Impression Evidence

- A person who places a body in a shallow or deep grave may find it necessary to stand in the grave while digging or manipulating the body. Footwear impressions may be left on the floor of the grave, perhaps under the body. Careful excavation may reveal these impressions.
- Digging creates multiple tool marks. The shape of a shovel, spade, or other digging tool may be impressed and left at the margins or walls of a grave. This area is the interface between the harder compacted soil external to the grave and the softer soil that was removed and replaced into the grave. The shape of the tool used to dig may be apparent on the walls at this margin.
- Additional tool marks may be present where a digging tool cut through roots. These marks should be preserved if indicated.

Soil Evidence

- Soil samples may be used to link a suspect with a burial scene. Soil samples from the suspect's shoes, tires, wheel wells, or clothing may be examined and compared to the samples taken from the scene.
- Soil samples should be taken from the area surrounding the gravesite.
- Soil samples should be taken from the bottom or floor of the gravesite.

Aquatic Recovery of Human Remains

12

General Principles

This chapter focuses on search and recovery techniques when a body is in water. In most cases, a body is submerged in a pond, lake, river, or salt-water environment. Under no circumstances should anyone without proper training attempt to effect an aquatic search or recovery mission. A well equipped aquatic search team is required to ensure the safety of the members of the operation and achieve a successful recovery that is appropriately documented.

A death scene investigator (DSI) must be versed in the techniques employed in water recovery and play a part in the effort. A submerged body will often hold valuable evidence that must be properly handled upon recovery. A DSI who is familiar with the techniques and technology of water recovery may also help narrow the team's search focus.

Locating Remains

Surface Search

- Visual location of remains by scanning the surface of the water is often very difficult. Unless the body is snagged on a limb, rocky prominence, or other feature, it will likely remain submerged early during the search.
- For surface searches from boats or from shore, polarized sunglasses may provide better visualization just below the surface.
- As a body decomposes, subsequent gas formation may cause it to become buoyant and float near the surface. This does not occur until decomposition has progressed and may take days or weeks, depending on the water temperature. The body may return to the surface in a face-down position, with the arms, legs, and head dangling into the water. Often only the shoulder blades and upper back are visible at or near the surface ([Figure 12.1](#)).



Body floating at surface. Viewed without polarizing lens (sunglasses or camera filter). Note that the reflection from the surface of the water obscures most of the body from view.

Body floating at surface. Viewed with polarizing lens. The reflection from the surface of the water has been eliminated and the body is easier to view.

Figure 12.1 Body floating at surface.

Aerial Search

- The use of helicopters or other platforms that allow observation by looking down at the surface of the water is very effective and should be employed as soon as practical.
- If a drowning or water burial occurs near a boat ramp or dock with sufficient access, a fire department ladder truck may be helpful for searching the area around the dock.

Underwater Search

Underwater recovery requires specialized training, certification, proper equipment, and familiarity with a specific aquatic environment. It should *never* be attempted by sports divers. An underwater search for a body may be conducted by a dive search team and is often most effective if a body is believed to be in or near a submerged vehicle or other container.

- To search a bottom with multiple snags and other features that may entrap a body, a dive team may be effective for an early search when movement of the body is minimal. Divers must be cautious around the snags and entrapments.
- Open bottom searches may be conducted by a dive team, although they are often less effective unless the search field is limited by observation from a helicopter or by technological methods such as side scanning sonar.

- Underwater visual searches may also be made by video taken from a remote operated vehicle. Such vehicles are portable and controlled by cables. They may be available from local harbor or ship inspection and marine construction facilities.

Drift

- An expert familiar with local waterways such as a marine and fisheries officer, ranger, or marine patrol should be contacted to help determine normal or expected drift from the suspected location of the drowning or submersion.
- Drift may also be observed from the surface, although it is important to remember that currents and water movements may be different beneath the surface at depths where they will affect the body.
- By maintaining neutral buoyancy just above the bottom, search divers may quickly be able to determine the direction or likely movement or drift of a body.

Computer Simulation Modeling

- Many navigable waterways and other water bodies supported by the U.S. Army Corps of Engineers, Coast Guard, and state agencies may have computer simulation models available. Although these models were not developed for the recovery of human remains, an adept operator may be able to simulate the conditions from the time since drowning or submersion and the submersion point, and greatly narrow the potential search area.
- Modeling may also be helpful in cold case recoveries—if a body is believed to have been submerged in a vehicle or other container and a lot of time has passed since submersion.

Cadaver Dogs

Cadaver dogs undergo highly specialized training. They differ from search-and-rescue dogs and bloodhounds in that they are trained to detect human body decomposition, not follow living human scents. Properly trained cadaver dogs may be used to locate submerged remains. The dog and its boat handler should complete joint training. The dog typically remains at the bow of the boat and alerts the handler when decomposition gases from a body percolate to the surface.

Technological Search

Methane gas detection — A body produces methane gas during decomposition. In an aquatic environment, methane will percolate up through the water to the surface and the gas release may be located by a methane detector.

Forward looking infrared (FLIR) and thermal tomography — FLIR allows an area to be scanned for differences in temperature that may identify human remains. The temperature of a recently drowned body will be higher than the temperature of the surrounding water for some time and it may be possible to detect the body using FLIR mounted on a helicopter or fixed wing aircraft.

Scanning sonar — The equipment is mounted on a tripod on the bottom of a boat or mounted on a remotely operated vehicle and submerged. Sonar is used to search smaller bodies of water such as ponds, where side scanning sonar equipment could not be effectively towed (Figure 12.2). Sonar provides a 360-degree view of the bottom regardless of water visibility (Figure 12.3).

Side scanning sonar — The equipment is submerged and towed behind a boat. It emits sonar waves that strike objects and return to the device. The returning waves reveal details of a lake, river, or ocean bottom. Side scanning sonar is useful for finding remains that rest on the bottom. It is not very effective for locating remains along a very rocky or irregular bottom surface or remains covered by silt or debris (Figure 12.4).

Magnetometry — A magnetometer detects the magnetic fields of buried ferrous (iron-containing) objects. Magnetometry will not detect a body. It is used to find ferrous artifacts associated with the body (e.g., belt buckle). The

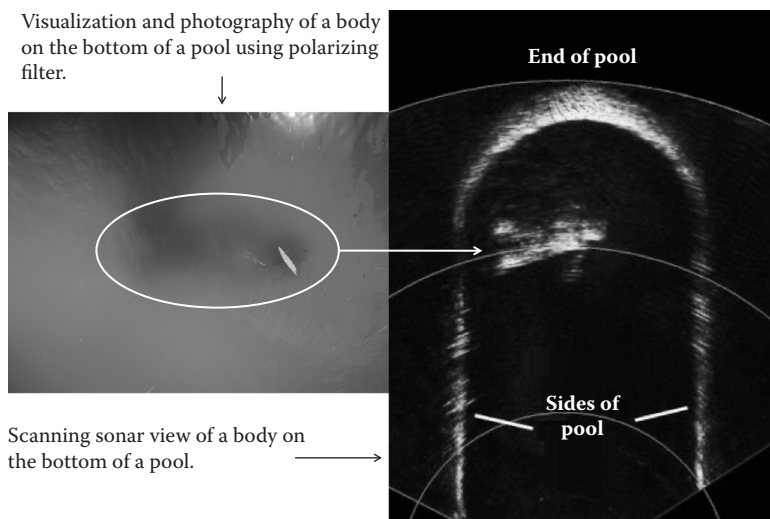
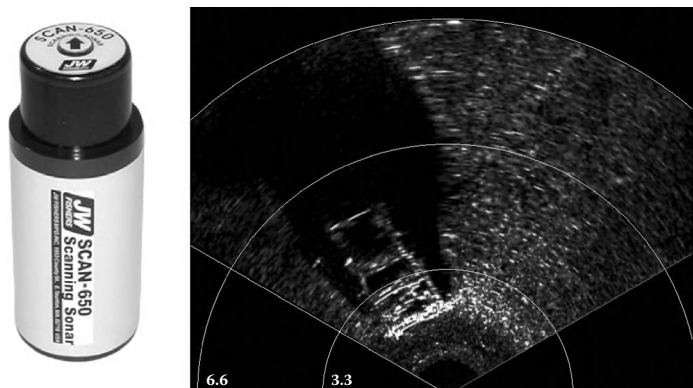


Figure 12.2 Body in pool (photo of sonar image provided by J.W. Fishers).

Scanning sonar view of a submerged automobile

**Figure 12.3** Submerged vehicle (photo of sonar image provided by J.W. Fishers).

technique is very useful if a body may be in or near a submerged vehicle or ferrous container.

Trained Volunteer Teams

NecroSearch International is a volunteer multidisciplinary team dedicated to assisting law enforcement to locate clandestine graves and recover evidence including human remains. Its website is www.necrosearch.com



Submerged 55 gallon drum imaged with side scanning sonar.

**Figure 12.4** Submerged 55-gallon drum (photo of sonar image provided by J.W. Fishers).

Processing Scene

- A recovered body should be moved to a level surface that has been prepared with an open body bag covered by a clean sheet.
- The body should be processed by the standard methods used for non-aquatic recoveries.
- Samples of water from the recovery site should be taken.
- If the body is in a submerged vehicle, do not rush recovery! Plan, prepare for, and set up the recovery of the body and vehicle. Both may reveal valuable forensic evidence.
- A body associated with a submerged vehicle or container must be fully documented photographically *before recovery* to the extent visibility allows.
- The process of lifting a submerged vehicle from the bottom will cause many items to shift. To the extent possible, fully photograph a submerged vehicle or container before it is moved.
- Using underwater metal detectors, magnetometers, and visual search techniques, search the area beneath and adjacent to a submerged vehicle or container.
- If a complex recovery of a body in a submerged vehicle or container is required, videotape the recovery with an underwater camera system.
- Any metallic item submerged in water may rapidly oxidize (rust) when exposed to air. Weapons and other vital metallic evidence should be secured while still submerged and placed in a container of the same water without exposure to air. This step may be safely accomplished in shallow water or on a recovery platform over a catch net to prevent loss of items like bullets and casings.

Processing Body

Documenting Recovery

- Record the name of the individual who discovered the body and the names of all those involved in the recovery.
- Obtain a detailed statement from the individual who discovered the body. Record details of the body's position, condition, and location (including depth) where found.
- Photograph the recovery process from the surface.

Remains Recovered from Predator

- Human remains have been recovered from the stomachs of marine predators such as sharks.
- If this occurs, immediately coordinate with the medical examiner to attempt to determine whether bite injuries are premortem or postmortem.
- Coordinate with a knowledgeable marine biologist to determine the hunting area of the predator in relation to the location where it was captured.

Estimating Postmortem Interval

13

The only accurate method of determining the time of death is observation by a reliable witness. Evaluating the changes that occur in a body after death may help you estimate the time since death, also known as the postmortem interval. Physiological changes since death may be observed at a scene and generally indicate the time since death. Careful observations of these changes should be recorded at the scene and presented to the medical examiner who may be able to determine a far more accurate postmortem interval than could be determined from scene indicators alone.

Determining Time Range

First, ascertain when the body was discovered, then work backward to determine when the deceased was last seen. That will provide a range of time that can be narrowed based on receipt of other information. Appendix I is a postmortem indicators worksheet.

Immediate Postmortem Changes

- Cessation of respiration
- Cessation of circulation
- Pale skin
- Muscular relaxation
- Contact flattening
- Fixed and dilated pupils

Early Postmortem Changes

Postmortem Lividity (Livor Mortis)

- Lividity can appear within 30 minutes; full development takes 6 to 12 hours.
- Evaluate the extent of lividity. Is it present? Is it fixed?

- Apply pressure with a finger to an area of lividity. If the lividity disappears under pressure, it is not fixed. The disappearance of the purplish discoloration is called blanching.
- Describe color and location of discoloration.
- Lividity should be consistent with body position.
- Lividity should be more prominent in body areas nearest the ground but not in contact with a surface.
- The location of lividity will shift if a body is moved before the lividity is fixed.

Postmortem Rigidity (Rigor Mortis)

- Rigidity can appear in 2 to 4 hours.
- It is generally fully developed by 12 hours.
- It is sustained in the fully-developed state for an additional 12 hours.
- It disappears over the next 12 hours.
- Rigidity appears first and disappears first in smaller muscles such as the fingers, neck, and jaw.
- *Factors that delay onset:* cold environment; asphyxial death (CO poisoning, hanging); hemorrhage; arsenic poisoning.
- *Factors that hasten onset:* rigorous exertion prior to death; death in a warm, moist environment; certain diseases; poisoning by alkaloids.
- Postmortem rigidity may not be as prominent in very young and very old decedents.

Postmortem Cooling (Algor Mortis)

- Algor mortis is determined by on-scene recording of body temperature.
- Consideration should be given to the effect of taking a rectal temperature on physical evidence found within the rectum in sodomy cases.
- Examination for algor mortis is normally done or not done in accordance with the local medical examiner's policy.
- The decedent's temperature is most often taken rectally with a sub-normal thermometer. Temperatures should be taken at least twice, at least 1 hour apart.
- If no thermometer is available, describe decedent's temperature as hot, warm, cool, or cold to touch.
- Describe any factors that may affect the rate of cooling. As a guide, the rate of body cooling is approximately 1 degree Fahrenheit (F) per hour for the first 3 hours, 2 degrees per hour for the next 6 hours, and 1.5 degrees per hour for the next 3 hours. Normal rectal temperature is 99.4 degrees F.

Factors Affecting Rate of Temperature Change

- A body may not necessarily cool if the ambient temperature exceeds normal body temperature; it will warm to ambient temperature (desert environment, sauna, etc.).
- Cold temperatures, winds, and drafts affect the rate of temperature change.
- Position affects temperature. A body in a spread-eagle position will cool faster than one in the fetal position due to the greater body surface exposure.
- Physical activity prior to death may affect temperature change.
- Physique: a large, obese body cools slowly. Bodies of infants and children cool faster.
- Contact with warm or cold objects.
- Body temperature at death (fever or hypothermia).
- A body covered with clothing or blankets cools slower.
- Location within structure (basement versus upstairs bedroom).

Late Postmortem Changes

Decomposition

Decomposition depends more on the environment of the body than the passage of time. Knowledge of decomposition changes may determine early investigative directions. The following are very general guidelines:

- Blue-green abdominal discoloration occurs in 24 to 36 hours.
- Bloating occurs in 36 to 48 hours.
- Marbling appears in 2 to 3 days.
- Skin blistering appears in 3 days.
- Skin slippage occurs from 4 to 7 days.

Adipocere Development

- A soapy white substance covering a body
- Most often encountered in moist conditions with little air movement
- May take months to form

Mummification

- Complete dehydration of skin, organs, and other tissues.
- Leathery, dry, shriveled appearance.
- Most often encountered in dry environments.
- May take weeks to years to form.

Skeletonization

- Removal of all soft tissues from bones
- Depends on exposure to environment and scavenger activity
- Completion takes weeks to years

Other Postmortem Factors

Insect infestation generally follows a specific order. For details about collection and processing of insect evidence, see Chapter 36.

Flies are usually the first insects to infest a body. Egg laying can start immediately or within several hours. Larva (maggots) appear in 1 to 3 days. Pupae and adults appear at various times, depending on species. Flies lay eggs in open, moist areas such as the mouth, nose, eyes, rectum, vagina, and open wounds.

Scene indicators are items of evidence at a death scene that indicate the time of a victim's activity.

Stomach contents may be determined at autopsy.

Wound Dynamics and Mechanisms of Injury

III

Asphyxia occurs when oxygenated blood cannot reach the brain. A variety of mechanisms can cause asphyxiation. Oxygenated blood cannot reach the lungs if the air passage is blocked through choking or suffocation. Preventing the chest from expanding to bring in oxygen is considered mechanical asphyxia. The obstruction of blood and air flow occurs in ligature strangulations and hangings. All these conditions deprive the body and particularly the brain of oxygen. Partial oxygen deprivation causes unconsciousness. Total oxygen deprivation may result in death.

Strangulation

Strangulation is caused by a constriction or compression of the neck, resulting in the obstruction of blood and or oxygen reaching the brain. There are three types of strangulation.

Manual Strangulation (Throttling)

This type of strangulation results from pressure of a hand, arm, or other limb against the victim's neck that causes compression.

General

- Throttling is usually homicidal. It may be accidental if death occurs from sexual activities involving hypoxophilia.
- Manual strangulation cannot be self-inflicted. When a person loses consciousness, his or her hands will relax and blood will return to the brain.
- Generally, there is a disparity in strength between the assailant and the victim or the victim was incapacitated prior to strangling.
- Look for evidence of a struggle (moved or damaged furniture, etc.).

Scene

- Look for signs of a struggle. Manual strangulation does not instantly incapacitate a victim.

- A rug under a victim's feet may have been displaced during strangulation and other items within reach may have been disturbed.

Body

- The skin of a victim may take on a bluish hue due to an increase of poorly oxygenated blood in the circulatory system.
- Evidence of a struggle may be evident, for example, bruising and defensive scratches around the neck if a victim attempted to break an attacker's hold. Scrapings found under the nails of the deceased may provide useful information about the attacker that can link him or her to the deceased.
- Fingernail marks, abrasions, and contusions on a victim's neck are common. They may have been caused as the victim struggled against the assailant or when the assailant fought against the victim (Figure 14.1).
- Cyanosis and petechial hemorrhages of the face and eyes will usually be present.

Ligature Strangulation (Garroting)

This type of strangulation involves pressure on the neck caused by a constricting band that is tightened by a force other than body weight (Figure 14.2).

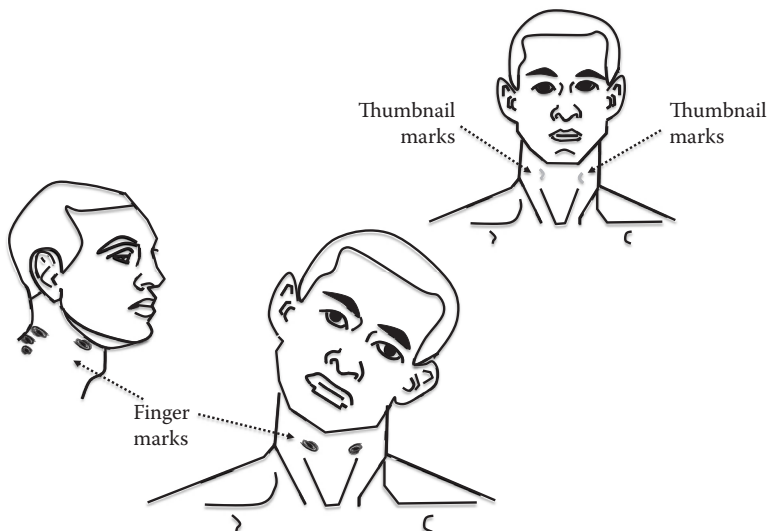


Figure 14.1 Manual strangulation.

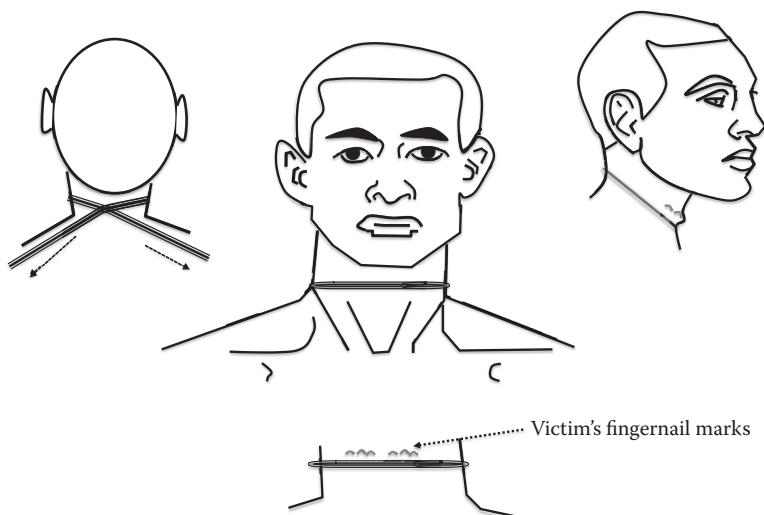


Figure 14.2 Ligature strangulation (garroting).

General

- Most garroting cases are homicides.
- Suicides and accidental deaths by garroting have been known to occur.

Scene

- The ligature is usually a common object such as a necktie, stocking, belt, or rope.
- The ligature may be missing. Expand the search area accordingly.
- Examination of the ligature mark may show a pattern consistent with the design of the ligature.
- Look for signs of a struggle.
- The ligature may contain trace evidence such as skin cells, blood, and clothing fibers from the perpetrator.

Body

- The decedent's face and upper chest may show a dusky purple discoloration. Petechial hemorrhages may be present in the whites of the eyes and skin.
- A ligature mark is usually horizontal, completely encircling the neck below the larynx (unlike a v-shaped mark on a hanging victim).
- A ligature will often leave a pattern abrasion on the neck.
- Do not remove the ligature from the body at the scene.
- Fibers may be present in the ligature mark even if the ligature is missing.

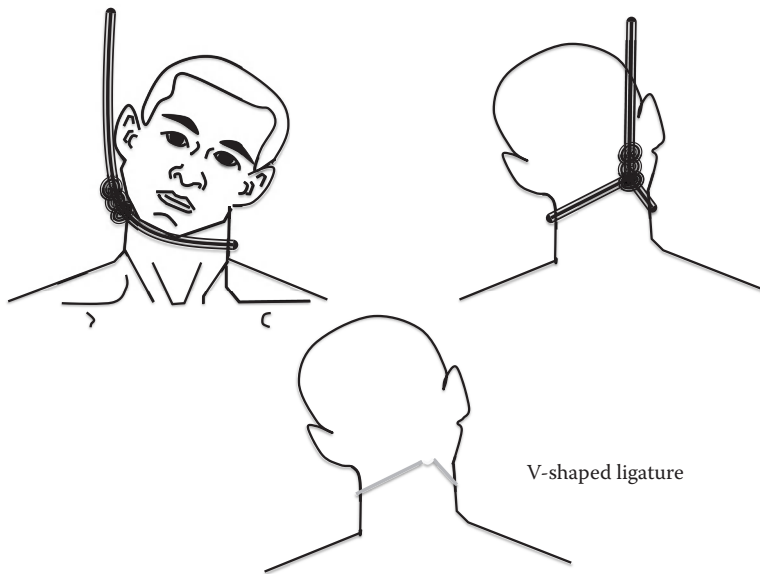


Figure 14.3 Hanging.

Hanging

Hanging is strangulation by means of a rope, cord, or similar ligature tightened by the weight of the body (Figure 14.3).

General

- Most hangings are self-inflicted, but foul play should not be ruled out until an autopsy and full examination of the death scene are completed.
- Homicidal hangings are rare. Simulating a hanging to disguise a homicide should be considered when injuries could not have been self-inflicted or evidence indicates the cause of death was not asphyxia.
- The decedent can be in any position, provided that the pressure on the neck is sufficient to block the blood vessels in the neck.
- Small quantities of blood and other fluids may purge from body openings and collect on clothing or beneath the body.

Scene

- The body may be partially or fully suspended.
- Note the position of the body, composition of the ligature, position of the knot, course and level of the ligature, point of suspension, and method of attachment.
- If the ligature is thrown over a suspension point and not tied to it, the ligature should be further examined. Examine both sides of the

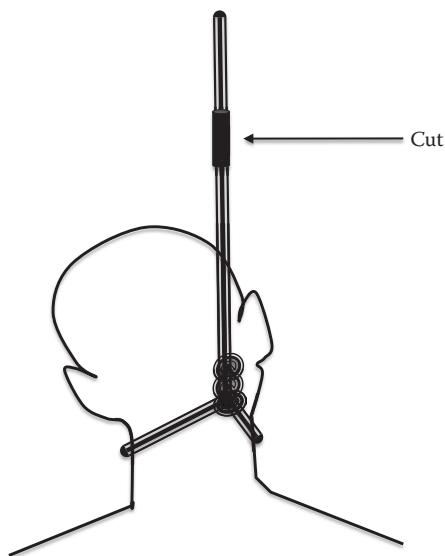


Figure 14.4 Identifying midway point, taping, and cutting.

suspension point. An abraded area on the side opposite the body may indicate the hanging was not a suicide.

- A ligature on a body should be removed by the pathologist at the time of the autopsy.
- If ligature material must be cut at the scene, find the midway point between the suspension point and noose and wrap electrical tape around the line. Cut through the center of the taped section to prevent the line from fraying or unraveling (Figure 14.4).
- If possible, remove the knot from the suspension point without cutting the line or untying the knot.
- If you must untie the knot, photograph it completely before you untie it. Videotape the untying. This may help reconstruct a complex knot. Take the rope or material used to tie the knot and the video to the autopsy for examination by the pathologist.
- Leave the noose and remaining ligature material attached to the body.

Body

- The face of a hanging victim may appear congested. The tongue may protrude and turn dark from drying.
- Lividity will appear in the lower parts of the arms and legs. If lividity appears in an area inconsistent with the position of a hanging body, the victim may have been hanged after death.

- The ligature groove is deepest and narrowest at the point of greatest pressure. The ligature takes an upward course in the region of the knot to form an inverted V.
- The ligature almost always lies above the Adam's apple.
- A furrow will usually remain on the neck even if the hanging victim has been cut down and moved to suggest another manner of death.
- If the ligature is not present, examine the furrow with an alternate light source to find embedded trace evidence. Consider tape lifting the ligature mark for trace evidence.
- A pattern present on a noose or rope is often transferred to the neck as pattern abrasions. Both the furrow and the line should be documented with scale.

Autoerotic Asphyxiation

This is an accidental death from self-inflicted asphyxia as the victim induces a hypoxic state to increase sexual excitement and the intensity of orgasm during masturbation.

General

- Autoerotic asphyxiation is typically a male masturbation practice although female autoerotic deaths have been documented.
- Death may involve ligature strangulation, hanging, asphyxiating gases, or suffocation.
- Death results when unconsciousness occurs before the victim releases the asphyxiating device.
- These deaths are distinguished from suicides by the presence of an escape mechanism and/or indications of repeated practice.

Scene

- Document scene indicators that show the victim sought privacy (closed blinds, locked doors, remote location, etc.).
- Any of the following indicators may be present at the scene: nudity, cross-dressing, pornographic materials, lubricants, receptacle for ejaculate (rag or tissue), strategically placed mirrors for self viewing, cameras, and bondage paraphernalia.
- Search for a cache of sexual paraphernalia or clothing associated with autoerotic practices.
- A scene may be altered by those who discovered the body due to the implications of this type of death.

- Bindings, suspension mechanisms, and escape mechanisms must be thoroughly examined and documented. They may initially appear too elaborate or complex to have been self-applied.
- Do not underestimate the creativity of a practitioner of autoerotic hypoxiphilia in devising complex self-bondage and asphyxiating devices.
- A ligature may be wide or padded to prevent marks or contusions.
- Look for signs of repeated activity, such as multiple abraded areas at the suspension point and elsewhere. Examine fixed suspension points such as anchor points in overhead beams.

Body

- Appearance will be consistent with a suffocation, hanging, ligature, or other strangulation death.

Choking

Choking is caused by obstruction of the internal airway.

General

- Death is generally accidental. Homicidal choking is rare. However, choking can occur if a victim is gagged and the gag becomes so saturated with saliva that air can no longer pass through the material.

Scene

- The scene should be examined to ensure consistency with witness statements.
- The decedent's location and activity prior to death should be noted.

Body

- If choking was caused by a visible object, leave the object where found for removal at autopsy.
- The signs and symptoms noted by a witness may have been attributed to a heart attack. A blockage of the airway may be discovered at autopsy, indicating a "cafe coronary."
- If homicidal choking is suspected, a thorough examination of the mouth and airway should be made for fibers and other trace evidence.

Smothering

A smothering death is caused by obstruction of the external airway.

General

- Children may accidentally smother if they play with plastic bags or similar objects.
- Placing hands, a pillow, or a cushion over another person's nose and mouth or placing a plastic bag over his or her head may cause homicidal smothering.
- An adult can obstruct an infant's or child's airway by placing the child against his or chest. A "soft suffocation" may be accomplished with a pillow.

Scene

- Smothering scenes rarely reveal evidence to assist in determining the method used unless the device was left at the scene.
- Look for signs of a struggle.
- Any object that may have been used to smother a victim should be examined under an alternate light source for the presence of the victim's saliva.
- Any object that may have been used and also the victim's saliva should be collected and processed for trace evidence.

Body

- Smothering may leave no external signs of injury, particularly on an infant.
- A pattern injury of bruising on the face may be consistent with the pattern of an item used to smother, such as a hand (Figure 14.5).
- Trace evidence may be detected around the nose and mouth.

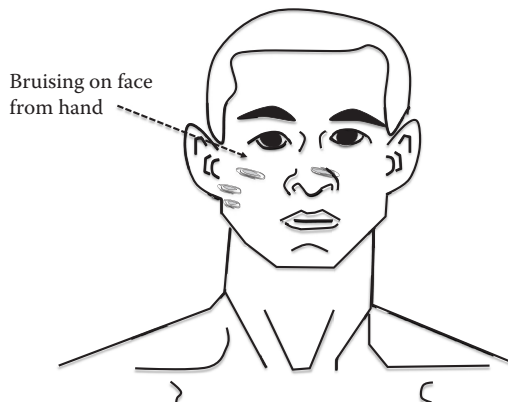


Figure 14.5 Pattern injury resulting from smothering.

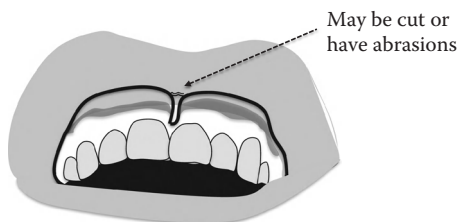


Figure 14.6 Frenulum anchoring upper and lower lips may be abraded or torn.

- The frenulum (thin tissue that holds the lips to the gums) may be cut or abrasions may appear around, under, and between the lips and gums (Figure 14.6).
- Look for signs of physical trauma resulting from a struggle (trace evidence under victim's fingernails).

Mechanical Asphyxia

Death results from manual compression of the chest by a heavy weight or the anatomical positioning of a victim that prevents respiration.

General

- Mechanical asphyxia is almost always accidental.
- It often occurs during auto repair when a jack slips and the weight of the vehicle rests on the victim's chest.
- As a result of drug or alcohol intoxication, a person may stumble or fall into a position that restricts breathing.
- During hypoxic sexual activities, death may accidentally result from bondage-related face or chest sitting that restricts airflow.

Scene

- Fully document the object causing the compression, its weight, and any safety measures or devices in place.
- Consider consulting a safety engineer.

Body

- Fully document the position of the body when discovered.
- Document any pattern injuries to the chest along with objects at the scene that may have created the patterns.
- Document any injuries to the hands or arms that indicate the victim may have attempted to remove the compressing object.

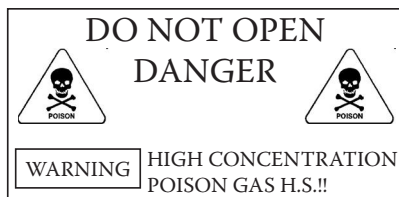


Figure 14.7 Warning sign placed by victim before poisonous gas suicide.

Chemical Asphyxia

This occurs when the atmosphere breathed lacks sufficient oxygen to support life or contains a chemical that prevents oxygen intake. The manner of death may be accident, suicide, or homicide.

General

- *Never* enter a chemical scene until the source of the chemical has been identified and secured.
- Deaths from chemical asphyxia are usually accidents or suicides.
- An increasingly popular form of suicide involves posting a sign (caution: poisonous gas) outside a vehicle or bathroom, then mixing chlorine bleach and detergent cleanser to release toxic gas inside the vehicle or room (Figure 14.7).
- Death may occur from “huffing” (inhaling fumes that produce a “high”).
- Carbon monoxide is the most common chemical asphyxiate.
- Carbon monoxide poisoning has been associated with homicides, suicides, and accidental deaths.

Scene

- Note the probable source of the asphyxiate.
- Note the exact position of the body.
- Note indications that the victim may have attempted to escape.
- Note indications of alcohol or drugs use that may have prevented the victim from attempting to escape.
- Note any safety measures or equipment in place or available and their functionalities.

Helium or Nitrogen Scene (Exit Bag or Exit Hood)

- Widely publicized method in right-to-die literature and on websites.
- Considered painless. The inert gases reportedly suppress the panicky need-to-breathe feeling associated with suffocation.

- Generally requires 5 minutes or less exposure.
- Requires a plastic bag fitted over the head and sealed at the neck with a drawstring or other device, a helium tank, and plastic tubing extending from a tank valve regulator to the hood.
- Not indicated through standard toxicology testing. Death may appear natural if the equipment is removed.
- If suicide is criminally assisted, the equipment may contain latent prints or DNA of individuals who assisted.
- Kits may be commercially obtained. Search for packing and wrapping materials, address labels, and credit card records.

Carbon Monoxide Scene: Heater

- Determine that the area is safe to enter.
- Determine probable source of gas.
- Charcoal grills used indoors produce significant levels of carbon monoxide and may cause accidental deaths.
- Fossil fuel heaters that are not properly vented will emit carbon dioxide into a home. They should be made safe by the fire department or a competent heating technician. While heater-caused deaths are usually accidental, look for evidence of tampering. Only a trained technician should test a heater.

Carbon Monoxide Scene: Vehicle

- Determine whether vehicle was still running when discovered. Carbon monoxide deaths may be accidental (running a vehicle in a garage with inadequate ventilation) or suicidal (sealing windows and channeling exhaust into the passenger compartment).
- Determine the location of the keys and position of the ignition.
- Determine the gas gauge level. If the key is in the “run” position and the engine is not running, the gas gauge should read empty if death was suicidal.
- Search for a device such as a hose used to transport exhaust emissions to the passenger compartment.
- Determine whether and how the windows were sealed; search for tape, rags, and other materials.
- If the vehicle was in a locked garage, determine position of the garage door and whether attempts were made to seal it.
- Collect hoses, tape, and other items used to channel the exhaust or seal the doors; preserve them for fingerprint analysis.

Body

Note the position of the body and whether lividity is present.

- Lividity associated with carbon monoxide poisoning is generally bright and cherry red.
- In both light and dark skinned persons, fingernail beds will appear red or pink.
- Lividity associated with cyanide is generally pink.
- Lividity associated with nitrites is generally brown.

Drowning

Drowning is usually a diagnosis of exclusion after a body is found in or near water and no other cause of death is determined.

General

- There is no reliable test that specifically determines death from drowning.
- It is important at autopsy to determine whether the victim was alive at the time of submersion.
- Since most drowning victims swallow water prior to death, a lack of water in the stomach of a person found in still water (bathtub, pond, etc.) suggests death may have occurred prior to submersion. In fast moving water, the lungs may fill after death.
- Most drownings involve inhalation of water. “Dry drownings” or “dry lungs” indicate the larynx closed by spasm and prevented water from entering the lungs.

Scene

- Quickly secure the scene and body, documenting all items relative to the incident.
- Removal of the body from the water after a long submersion may cause rapid decomposition. Thorough photography of the face and body is very important.
- Metal objects removed from or associated with the body may quickly corrode when removed from the water. Place such items into a container filled with water from the scene.
- Fully document all rescue and resuscitation attempts.

- Record weather conditions, depth of water, water currents, water condition (rough, smooth), and other pertinent factors.
- A sample of water may be taken for comparison with water and contaminants obtained from the lungs.
- Broaden the scene of an outdoor drowning. Find and document any signs that the victim walked, slipped, fell, or was carried into the water.
- Any equipment such as SCUBA gear involved in the incident should be seized for expert examination for functionality.
- A dive computer (console or wristwatch) at the scene must be seized. It will contain the information about the fatal dive and previous dives. Data from the dive computer should be recovered and logged by someone very familiar with its operation.
- In a SCUBA-related diving death, determine the depths of the dives, the number of dives, time at depth for each dive, and the intervals on the surface between dives.
- Search for missing clothing and other items belonging to victim.

Body

- Note the exact location and depth where found using GPS coordinates if possible. This information may become important for drift studies to determine point or location of immersion.
- Note any unusual findings associated with the body such as bindings and weights.
- Note specific body conditions, particularly rigor, livor, and algor mortis. The intense physical activity associated with drowning may often dramatically accelerate the onset of rigor mortis.
- Note any signs of struggle, scratches, bruising, or marks that may have been self-inflicted during drowning.
- Note any objects clutched in the hands, for example, weeds or other flora from the water where the drowning occurred.
- Note any frothy sputum in the mouth or nose.
- Note injuries to the head, back, or shoulders that may be consistent with impact by a boat or propeller.

A sharp force injury results from cutting (incised wound), stabbing, or chopping.

General

- Evaluation of a wound can provide information about the type of weapon used.
- Wound patterns and their frequencies may help determine motive.

Scene

- A recovered weapon may yield fingerprints, hairs, fibers, and blood and tissue evidence.
- If the weapon has a broken or chipped tip or edge, the broken piece may be lodged in the victim's body. Inform the medical examiner who will perform the autopsy.
- Suspect's and victim's clothing may provide blood spatter, trace, and serological evidence.
- Blood spatter evidence should be thoroughly documented.
- If the type of weapon used is not obvious, the wounds may indicate the type of weapon used.

Body

- The length and depth of an incised wound will not provide specific information about the weapon ([Figure 15.1](#)).
- Close-up photography of injuries is essential to the proper evaluation of wounds.
- Incised wounds are often sustained by persons defending themselves from knife attacks. These wounds are most common on the forearms,

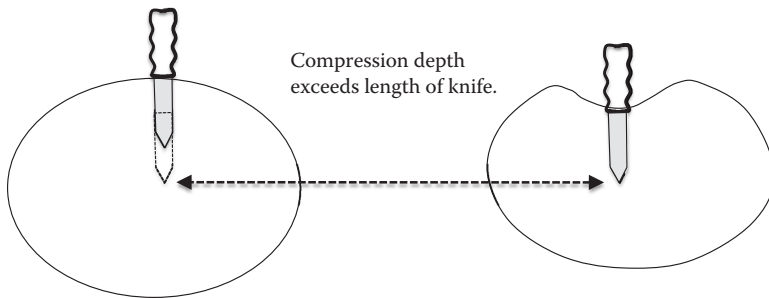


Figure 15.1 Blade length cannot be determined accurately by measuring the depth of a wound track.

palms, fingers, and backs of the hands and can be severe. They are known as defensive injuries.

- Hesitation wounds are usually seen in suicides and suicide attempts as the victim gathers the courage to complete the act. They are usually multiple, parallel, incised wounds found on the wrists and neck. Hesitation wounds on the wrists are usually found between the base of the palm and the elbow.
- The exact length of a blade or cutting instrument cannot be determined from a wound track. The wounded area may have been compressed when injured.
- “Hilt” marks where the handle of the knife impacted the skin may be evident in cases where the blade fully penetrated the body (Figure 15.2).
- The width of a blade (measured across from sharp edge to dull edge) cannot be measured exactly from a wound because the knife may have been drawn through the injured tissues (Figure 15.3).
- The shape of a stab wound depends on the shape of the instrument and Langer’s lines—elastic fibers in the skin that run in the direction in which skin is stretched (Figure 15.4).
- Stab wounds will gape if the stab is across or perpendicular to Langer’s lines; it will gape less if the stab is parallel to the lines.
- After a knife has been shoved into the body, the twisting of the knife or the struggling of the victim when it is removed can cause “Y” or “L” shaped wounds.

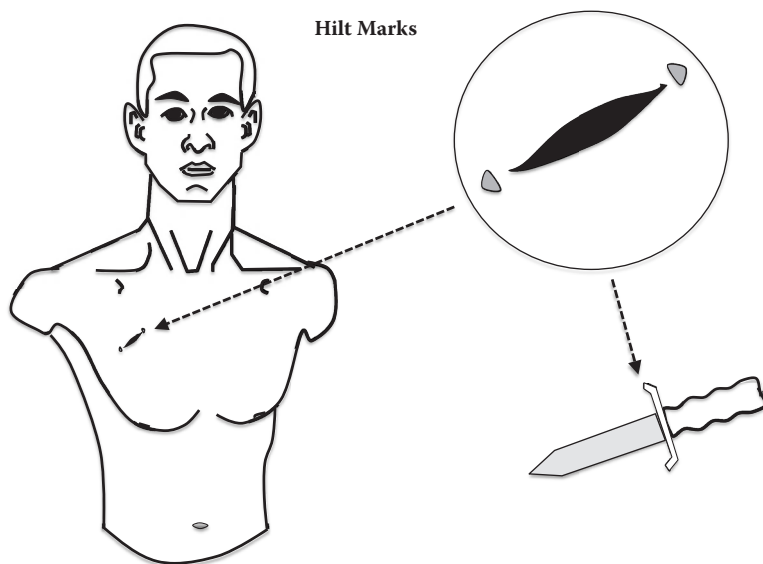


Figure 15.2 Hilt marks may leave pattern injuries on the skin.

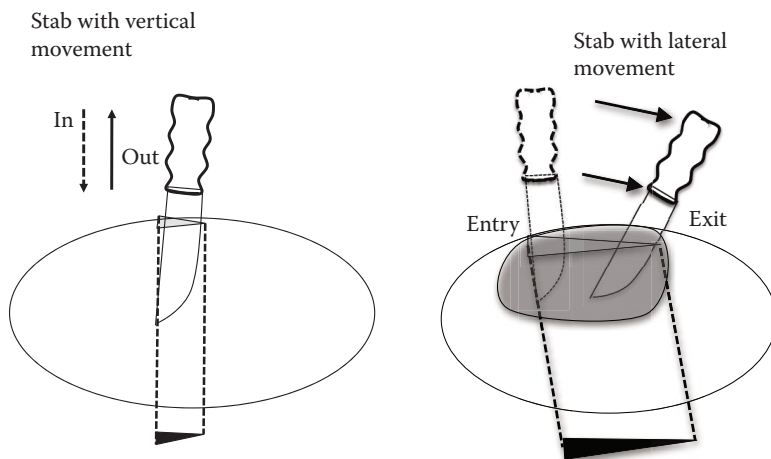


Figure 15.3 Blade length cannot be determined accurately by measuring a wound.

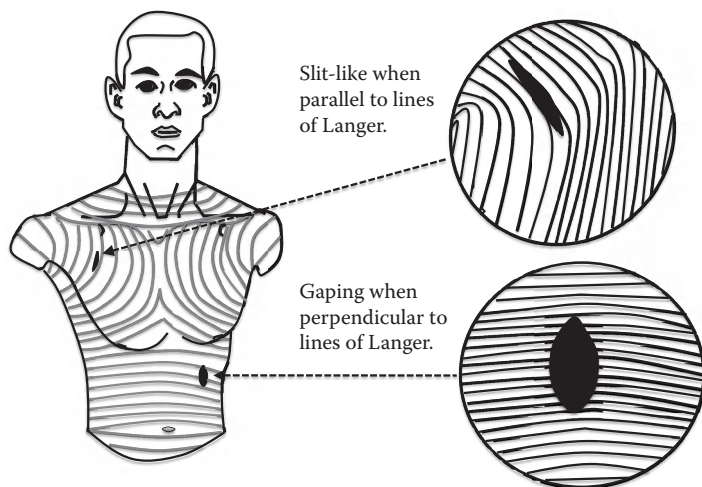


Figure 15.4 Langer's lines.

- Stab wounds in pairs (or other multiples) may be caused by scissors or forks (Figure 15.5). A fork will create a consistent distance between paired stabs. Varied distances between paired stabs indicate a weapon like scissors.

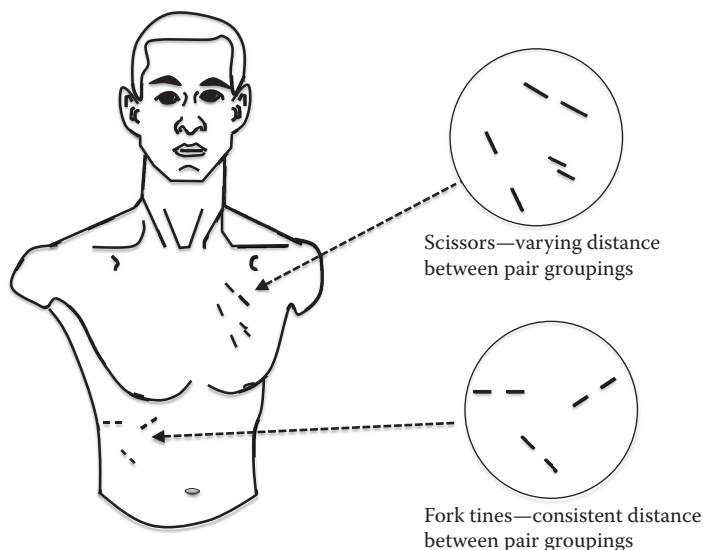


Figure 15.5 Paired stab wounds.

Blunt force injuries are produced by falls, collisions, or blows. They result in abrasions, contusions, lacerations, and fractures.

General

- Blunt forces tear, crush, and shear tissues. Blunt forces are transmitted by objects with relatively broad or rounded edges.
- The pattern and appearance of a blunt force injury varies, depending on the amount of force, the location of the wound, and the type of weapon.
- Blunt force trauma can also cause fractures if sufficient force is used.
- Abrasions, contusions, and lacerations are the three general types of blunt force injuries. A blunt force can cause any combination of these types of injuries.
- Deaths from blunt force injuries may occur in child abuse, assault, and accident cases.

Scene

- Weapons may have fingerprint, blood, hair, or tissue evidence on their surfaces.
- Blood spatter evidence should be thoroughly documented.

Body

- Weapons may leave identifiable injury patterns ([Figure 16.1](#)).
- Injury pattern may suggest the type of weapon used.
- Close-up photography of injuries with and without scales is essential for proper evaluation of wounds. Consider ultraviolet and infrared photography.
- While an abrasion may be the only visible injury, significant internal injuries may be present.

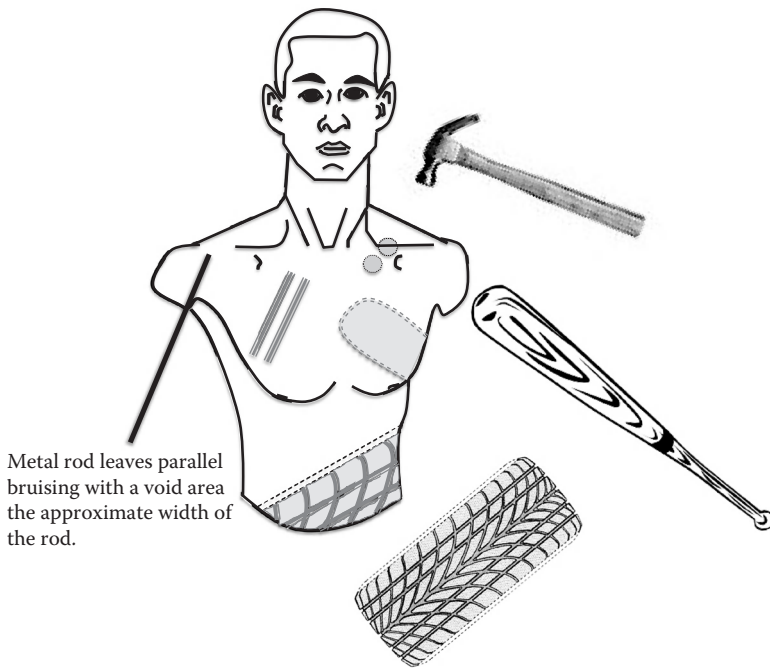


Figure 16.1 Pattern injury caused by blunt force trauma.

- Patterns on the weapon may be imparted to the skin, and called pattern abrasions.
- Contusions (bruises) do not necessarily reflect the intensity of a blow. Bruises may or may not transmit patterns from the object that caused them.
- Lacerations may be external or internal and involve tearing of organ tissues.
- Trace evidence transfer between weapon and victim is possible. Paint, debris, or fragments of the weapon may be found in a wound. Hair, blood, or fibers from the victim's clothing may be found on the weapon.
- The size and shape of the laceration may suggest the type of weapon used.

Chopping Injuries

17

Chopping wounds demonstrate a combination of both blunt and sharp force injuries. A typical weapon used to inflict a chopping injury might be an axe, hatchet, or machete.

General

- The scene and body will exhibit combinations of conditions expected from sharp force and blunt force injuries.
- Refer to the appropriate guidelines in Chapters 15 and 16 for processing incidents involving these types of injuries.

Scene

- These wounds are usually caused by common objects that are sharper and heavier than household knives. Look for an ax, machete, meat cleaver, boat propeller, or similar item at the scene.
- Blood spatter evidence should be thoroughly documented.

Body

- Weapons may leave identifiable injury patterns.
- Injury pattern may suggest the type of weapon used.
- Close-up photography of injuries with and without scales is essential for proper evaluation of wounds. Consider ultraviolet and infrared photography.
- While an abrasion may be the only visible injury, significant internal injuries may be present.
- Patterns from the weapon may be imparted to the skin and called pattern abrasions.

- Contusions (bruises) do not necessarily reflect the intensity of a blow. Bruises may or may not transmit a pattern from the object that caused them.
- Lacerations may be external or internal and involve the tearing of organ tissues.
- Trace evidence transfer is possible between the weapon and the victim. Paint, debris, or fragments of the weapon may be found in a wound. Hair, blood, or fibers from the victim's clothing may be found on a weapon.
- The size and shape of the laceration may suggest the type of weapon used.

Firearms

Handgun and Rifle Wounds

18

Gunshot Wounds

When a handgun or rifle is discharged, fire, smoke, a bullet, and burned and unburned powder exit the barrel. Gunshot wounds exhibit different appearances that depend on the proximity of the weapon to the target and the bullet's direction of travel. This chapter describes common characteristics of handgun and rifle wounds. Shotgun wounds are discussed in Chapter 19.

Entrance and Exit Wounds

Entrance Wounds

- Most entrance wounds are surrounded by reddish zones of abraded skin, regardless of firing distance.
- Fibers from clothing may be driven into a wound.
- Entrance wounds resulting from a ricochet or a bullet striking an intermediary target may be shaped irregularly.
- For more details of entrance wounds, see the descriptions based on the effects of distance detailed below.
- It is not possible to determine a bullet's trajectory through the body from examination of the entrance wound alone.

Exit Wounds

- Exit wounds are usually more irregularly shaped than entrance wounds.
- Exit wounds are usually larger and usually do not exhibit abrasion rings.
- As a bullet travels through a body, it may tumble, deform as it strikes objects, or tumble *and* deform, in which case the exit wound will often appear larger and more irregular than an entrance wound.

- The size and shape of the exit wound is often dependent on the body area where it exits. In slack skin, a wound tends to appear smaller and slit shaped. In areas where the skin is stretched across a hard surface such as bone, the exit wound may appear larger and more irregular.
- In some circumstances, an exit wound may exhibit an abrasion ring and a regular shape. This occurs when the victim was against a hard surface such as a wall or floor or wore constrictive clothing such as a bra or belt. In such cases, the hard surface or clothing supports the skin, keeping it from tearing into irregular shape and is called a shored exit wound.
- As the skin dries, an exit wound may look more like an entrance wound. The absence of gunshot powder residue on the surrounding skin or clothing (in cases of close range gunshot wounds) may help identify an injury as an exit wound.
- Bullets may be found just under the skin, partly protruding from the skin, or loose in the clothing around an exit wound.

Effects of Distance on Gunshot Wounds

Contact Gunshot Wounds

When the muzzle of a gun is held against a body at the time of firing, gas, soot, powder, and metallic particles from the bullet are shot into the wound track with the bullet. Because a gun can be held against a body in several ways, contact wounds are further classified as hard, loose, angled, or incomplete (variation of angled).

Hard Contact Wounds

- The muzzle of the gun is pushed against the skin, indenting the skin so that it wraps around the muzzle ([Figure 18.1](#)).
- A hard contact wound is burned by hot gases and blackened by soot. Soot can be washed off. It differs from stippling—burned and unburned powder lodged into the skin that cannot be washed off.
- All the material emerging from the muzzle will be driven into the wound, often leaving very little external evidence of a contact wound. In cases where no soot can be seen, autopsy analysis may reveal microscopic soot and powder grains.
- Muscle surrounding an entrance wound may turn cherry red due to carboxyhemoglobin formation from the carbon monoxide in the muzzle gas.

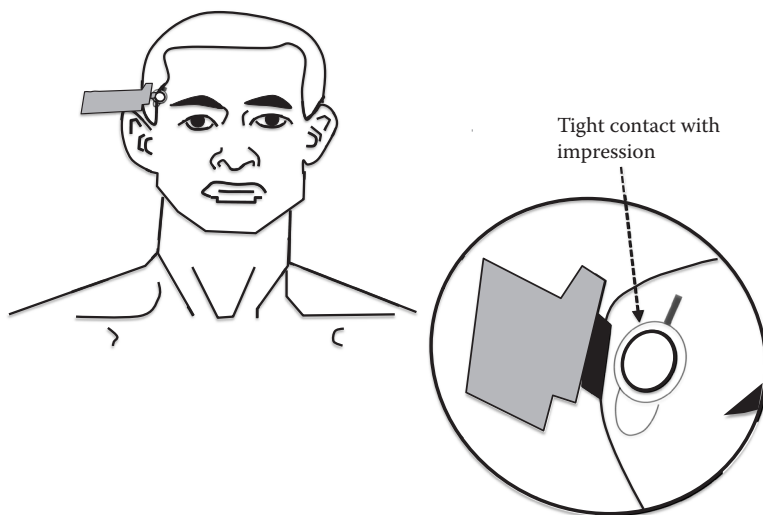


Figure 18.1 Muzzle impression from hard contact wound.

- Hard contact wounds over areas of the body where the skin is supported by flat underlying bone are usually star-shaped or stellate. They are caused by the energy of the gases escaping from the gun barrel. The gases have little room to expand between the skin and the bone, causing the skin to balloon and lacerate. Soot, smoke, and powder are blown into the wound (Figure 18.2). These wounds are typically found on the skull. Small caliber, low energy weapons may not always produce enough energy to cause stellate wounds.

Loose Contact Wounds

- These wounds result when a gun muzzle is in contact with the skin but is not pushed firmly against the body at the time of discharge.
- Since the skin does not create a seal around the muzzle, hot gases can escape and form a circle of soot around the wound. Soot, smoke, and powder will be present inside the wound. Most of this soot can be wiped away easily (Figure 18.3).

Angled Contact Wounds

- An angled contact wound is created when the gun barrel is held at an angle to the skin. The complete circumference of the muzzle does not make contact with the skin.
- Gas and soot escaping from the space between the muzzle and the skin radiate outward, causing two patterns of soot. The first pattern is a blackened, seared zone that maybe pear-shaped, circular, or oval. The second

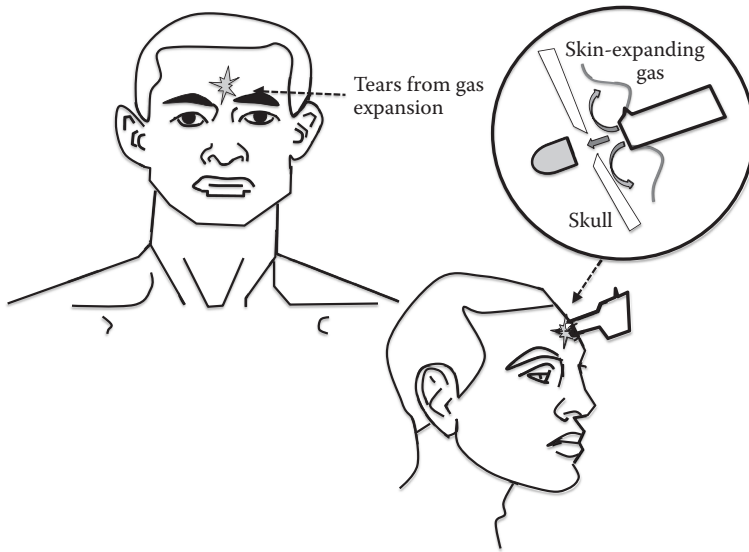


Figure 18.2 Hard contact wound over flat bond.

pattern is usually light gray and fan-shaped. The entrance wound is often located at the base of the blackened, seared zone ([Figure 18.4](#)).

- As the angle between the gun and skin increases, the entrance hole will be found more toward the center of the blackened zone. Most of the blackened, seared zone will appear opposite where the muzzle made contact with the skin. This indicates the angle from which the gun was fired.

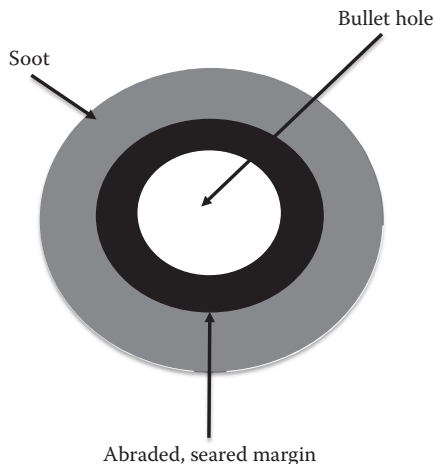


Figure 18.3 Loose contact wound.

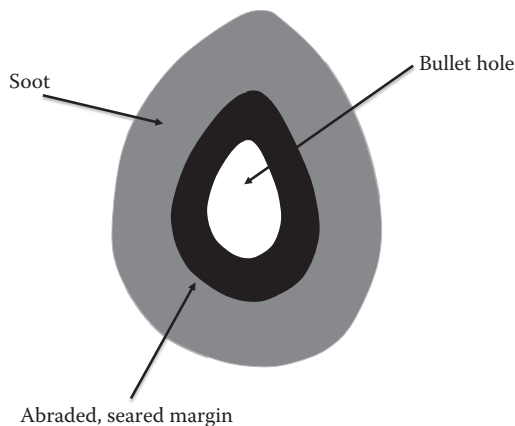


Figure 18.4 Angled contact wound.

Incomplete Contact Wounds

- Incomplete contact wounds are variations of angled contact wounds. They occur over body surfaces that are rounded or not completely flat.
- The weapon is held against the skin, but a gap exists between the muzzle and the uneven skin surface. Hot gases escape from the gap, forming an area of blackened, seared skin.
- Incomplete contact wounds are often seen on the head.

Near Contact Wounds

- Near contact wounds fall between contact and intermediate range wounds. The muzzle of the weapon is not in contact with the skin; it is held a short distance away.
- A near contact entrance wound is surrounded by a wide zone of powder and soot, overlying blackened, seared skin. The zone of searing is wider than zones resulting from loose contact wounds. The soot in the seared zone penetrates the skin and cannot be completely wiped away.
- Since near and loose contact wounds have similar characteristics, it is not always possible to distinguish them, especially if the muzzle is held perpendicular to the skin.
- With handguns, small clumps of unburned powder may accumulate at the edges of the entrance in the seared zone of the skin.
- Near contact wounds with handguns usually occur at ranges less than $\frac{1}{2}$ inch. Distance will vary based on caliber, ammunition, and barrel length.

Intermediate Range Wounds

- The muzzle of the weapon is held away from the body, but near enough for powder particles to be projected into and onto the skin. For handguns, powder tattooing begins at a muzzle-to-target distance of approximately $\frac{1}{2}$ inch.
- Powder tattoo marks are produced by the impact of powder grains on the skin. Tattooing consists of reddish-brown to orange-red punctate (small dot or point) lesions surrounding the entrance wound (Figure 18.5).
- Tattooing may take a circular or oval shape around the entrance wound, depending on the angle of the gun to the target at firing, the shape of the target (flat or rounded), and the presence of clothing or hair (that may keep powder grains from reaching the skin).
- Vital reaction surrounding powder tattooing indicates a victim was alive at the time of the shooting. The presence of the vital reaction can be determined only by a pathologist.
- In addition to tattooing, soot may also be deposited on the skin or clothing. Soot is the product of burning gunpowder and emerges from the muzzle when a weapon is fired. The size and appearance of a soot pattern depend on many factors including the distance of the muzzle to the target, type and caliber of weapon, barrel length, type

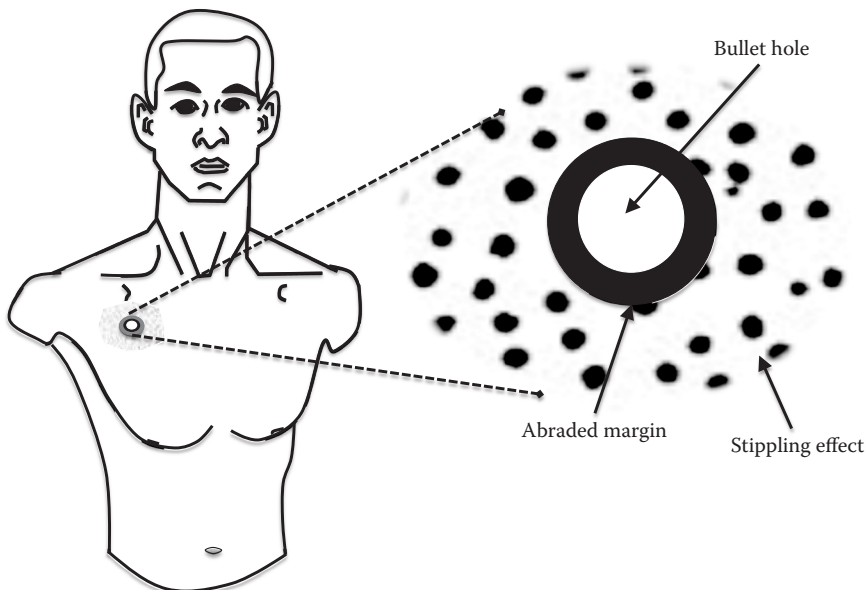


Figure 18.5 Intermediate range gunshot wound.

of gunpowder in the bullets, angle of the gun to the target, and the characteristics of the target.

- The distance between the muzzle of the gun and the target is important because it affects the appearance of the soot and powder particle distribution. As the range between the muzzle and the target increases, the size of the area of soot blackening increases, and the density of the soot on the body decreases until it becomes too faint to indicate where the soot begins or ends.
- As the distance between the gun muzzle and target increases, the density of the powder particles will decrease until few particles adhere to the target surface.

Distant Wounds

- When a gun is fired from a distance, the only marks on the target are produced when the bullet penetrates the skin. The muzzle of the weapon is too far from the target to deposit soot and unburned powder on the target. Soot and powder particles serve as indicators of distance between the gun and target. They are absent on a distant wound.
- The only visible characteristics may be an abrasion ring and defect.
- A distant range wound may be difficult to distinguish from an intermediate range wound. For instance, an intermediate range gunshot wound may look like a distant range wound if clothing or another object comes between the gun and the body, preventing soot and unburned powder from reaching the skin. Only careful examination of the facts (e.g., was the victim clothed at the time of the shooting?) will allow correct identification of this type of gunshot wound.

Rifle Wounds

Rifle wounds have similar characteristics to wounds caused by handguns. However, rifle shots usually involve much more energy.

- A handgun placed in the mouth and fired may produce relatively little structural damage from expanding gases. However, a rifle shot will usually cause massive damage to the mouth and head. The damage is even greater if the victim closes his mouth around the muzzle of the rifle.
- When studying self-inflicted rifle wounds, care should be taken to determine whether the victim was capable of firing the weapon without help. The person's reach should be measured and compared with the reach required to fire the rifle.

Firearms

Shotgun Wounds

19

Wounds produced by shotguns typically appear very different from wounds caused by rifles and handguns. This distinctive appearance results from several differences between these weapons. A shotgun disperses one large or many smaller projectiles with a single shot. The number of projectiles and distance from muzzle to target contribute to a distinct but more variable shot pattern when compared to a single projectile from a rifle or handgun.

Shotgun Wounds

Exit Wounds

- Individual exit wounds attributable to the separate projectiles are not common.
- Instead of an exit wound, there is often an exit area of massive tissue loss or shot pellets may be discovered just underneath the skin on the side of the body opposite the entrance wound.

Shotcup and Wadding

- The shot propels the wadding or shotcup forward of the muzzle ([Figure 19.1](#)).
- The wadding and shotcup travel a much shorter distance than the shot.
- At close range, they enter the central defect with the mass of shot.
- As distance increases, they strike (and often leave a mark) off center from the shot mass ([Figure 19.2](#)).
- Eventually the shotcup and wadding lose sufficient force to make marks or they fall to the ground before reaching the target.

Effects of Distance on Wounds

Contact Wounds

- Characterized by burning, soot, powder, and a margin abrasion around the entry wound.

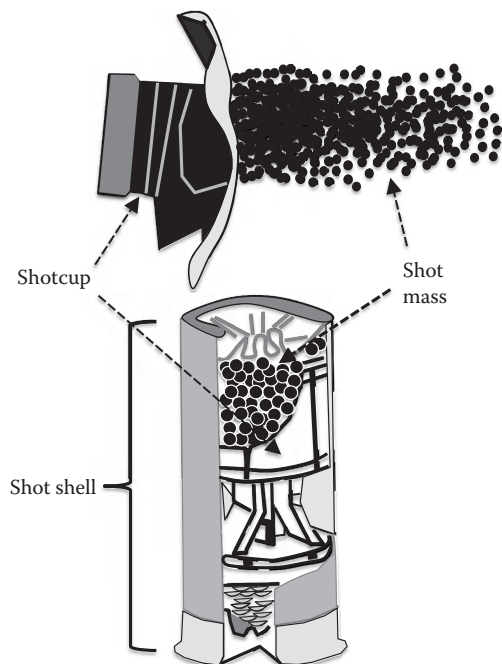


Figure 19.1 Shotcup and shot mass.

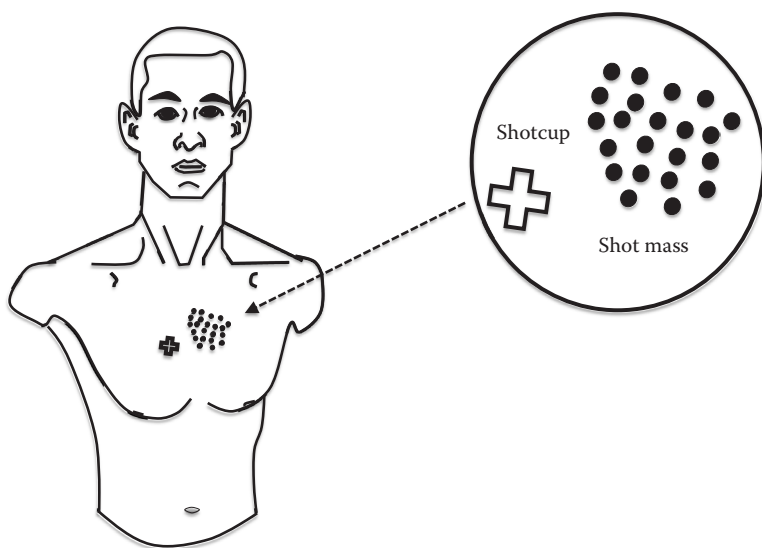


Figure 19.2 Shotcup strikes off center from shot mass.

Stellate Wounds

- These may be present on hard and soft surfaces because of the highly pressurized gases that exit the muzzle of the shotgun.

Hard Contact Head Wounds

- These wounds cause massive fragmentation to the skull and brain. Large fragments of the skull and the brain may be found many feet away from the body or imbedded in walls or ceilings.
- The face of the decedent may be completely unrecognizable. It is important to collect tissue and bone fragments because a pathologist may be able to reconstruct portions of the face.

Intra-Oral Wounds

- May be characterized by soot on the palate, tongue, and sometimes the lips.
- The intra-oral discharge of shotguns often creates stretch-mark changes radiating from the mouth and extensive damage to the brain and skull.

Wounds to Trunk

- Wounds are usually circular; diameter is approximately equal to the diameter of the bore of the weapon.
- Soot is not usually visible around the margins of contact wounds. The edges of wounds are burned and blackened by the hot gases.
- The front sight or muzzle may leave an imprint on the skin.
- The entrance wound may be surrounded by a large area of abraded skin.

Near Contact Wounds

- A circular area of soot is deposited upon the skin immediately surrounding the entrance wound ([Figure 19.3](#)).
- As the distance between the shotgun muzzle and the target increases, the diameter of the soot deposit increases and the density decreases.

Close and Intermediate Range Wounds

- An abrasion ring may be present because a shot tends to enter the body as a mass.
- When the distance between the shotgun muzzle and the target increases beyond an inch or two, faint powder tattooing may occur.

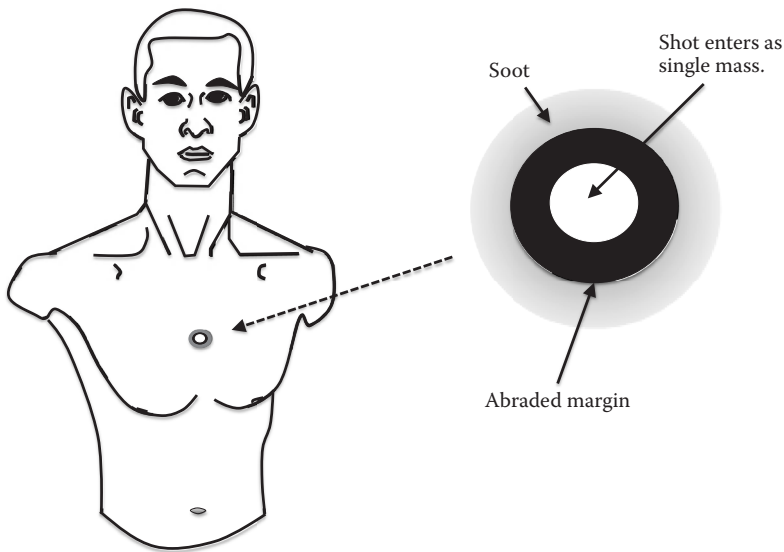


Figure 19.3 Near-contact shotgun wound.

It may be less pronounced than tattooing resulting from other gun-shot wounds.

- Range affects wound pattern. At close range, shot pellets enter the body as a group.
- As the muzzle of the shotgun is moved away from the body, the diameter of a shotgun entrance wound increases until individual pellets separate from the main mass. This creates a scalloped edge. The result is a “cookie cutter” wound ([Figure 19.4](#)).
- The size of the shot pattern on the body should be measured to determine the range. Remember: even the best range determination is only an estimate.
- As the range increases, the wadding will separate from the main shot mass and may impact the side of the entrance wound before entering the body at relatively close ranges. This may create an irregular abraded margin on one side of the entrance wound.
- Beyond a range of 5 to 8 feet, the wadding will drift to one side of the discharge until it impacts the skin adjacent to the entrance site but does not penetrate the skin. At this range, the wadding may leave an imprint (usually circular or oval) on the skin.

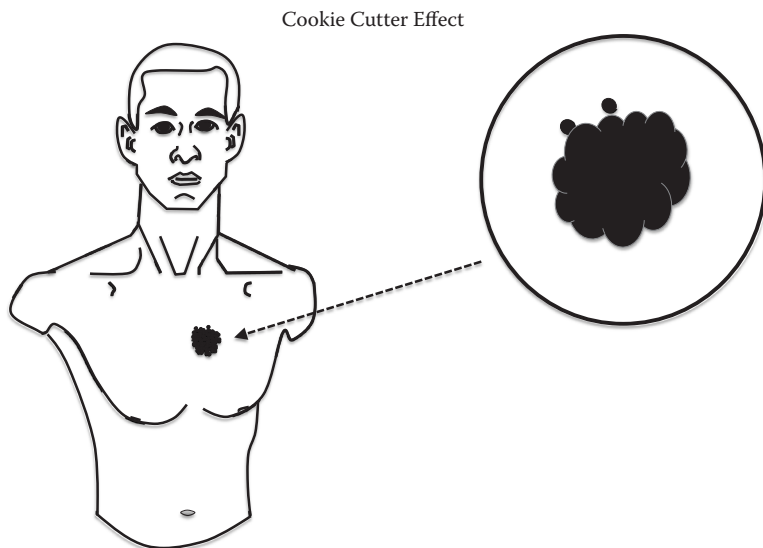


Figure 19.4 Close-to-intermediate contact shotgun wound.

Long Range Wounds

- Shot fired from a shotgun over a distance does not travel in a clump and may be very dispersed.
- Skin defects created in the skin are dependent on the size of the shot. Defects caused by bird shot are small and round, with tiny marginal abrasions. Buckshot produces defects that resemble bullet wounds.
- The skin may be contused or abraded from the impact of the wadding although the wadding does not usually penetrate at these distances.
- If shot strikes an intermediate target (door, tree, heavy clothing) before impacting the victim, range estimates from the shot pattern on the body will not be accurate.

Explosive injuries are generally generated from a blast wave or its effects on structures and other objects.* The concussive force of the blast wave may be responsible for blunt force trauma. Additionally, sharp force and blunt force may also result from a device designed to produce fragmentation. Incidental fragmentation may occur and cause blunt force trauma. Victims may be injured by objects thrown by a blast wave or as a result of structural collapse. Explosive injuries may be accompanied by thermal injuries, depending on a victim's proximity to the device or secondary fire or heat from items ignited by the explosion.

General Considerations

- Have an EOD team clear the area to ensure safety prior to scene examination.
- If fire accompanied the explosion, consider the appropriate steps detailed in Chapter 21 (Thermal Injuries).
- Need for further investigation is based on the cause of death determined by an autopsy. Do not release the scene until the autopsy is completed.

Scene

- Safety is always the paramount concern. Consider the possibility that secondary explosive devices were set to kill or injure responders to the scene.
- Structural collapses, stray electrical lines, and venting natural gas are potential hazards at a blast scene.
- The perimeter of an explosion scene should be at least one and one half times the distance from the center of the explosion to the most distant debris.

* Information in chapter from Explosion and Blast Injuries: A Primer for Clinicians, Centers for Disease Control, www.bt.cdc.gov/masscasualties/explosions.asp

- Coordinate a death scene response with organizations that specialize in post-blast investigations. These may include local, state, or federal assets.
- Searches involving explosion victims should be as thorough as possible. Small bone and tissue fragments may be the only remains found but may be sufficient for DNA identification. Special collection techniques may be required.
- Teeth are especially important items. Dental identification may be possible if enough teeth are recovered.
- Appendix G is a post-blast worksheet. It can be used to document a post-blast scene via polar coordinates.

Body

A fatal injury depends on a number of factors: size of the blast, degree of containment, distances of victims from the blast, intermediate or barriers between the victim and the blast, and susceptibility to secondary collapse of structures associated with the victim. In all cases, it is important to identify to the extent possible the pre- and post blast locations of bodies and body parts.

Mechanisms of Blast Injuries

Primary

- Caused by blast wave effect; unique to high explosives (military grade demolition explosives).
- Primary effect on gas-filled structures of the body such as the lungs, gastrointestinal tract, and middle ear.
- Blast lung (pulmonary barotrauma) is caused by over-pressurization from forced air embolism or air outside the lung forced into the space between the lung and chest wall (pneumothorax).
- Abdominal bleeding and perforation of the gastrointestinal tract.
- Traumatic brain injury without external evidence of impact.

Secondary

- Caused by penetrating and blunt force injury from flying debris, shrapnel, and bomb parts.
- Penetrating injuries from foreign objects.
- Blunt force trauma from items striking the victim.

Tertiary

- Caused when a victim is thrown by a blast.
- Fractures or amputations of extremities.
- Fractures of trunk or skull.
- Brain injuries associated with falls.

Quaternary

- Category includes all other blast-related injuries.
- Flash burns from initial blast effect.
- Partial and full thickness burns from fires associated with blast.
- Crushing injuries.

Cautions

- All fatal explosion victims should receive full body x-rays prior to autopsy.
- Bomb parts or unexploded munitions parts may have penetrated victims' bodies and pose threats to investigators.

Thermal injuries result from heat and direct flame impingement upon the skin, underlying tissue, and mucosa.

General Considerations

- Most injuries and deaths caused by fire are accidental.
- Fire may be used to mask the results of other crimes and causes or manners of death.
- Most fire victims die of carbon monoxide poisoning. Thermal injury, if present, is often secondary.

Scene

A fatal fire may require processing of both a death scene and a fire scene. A fire death scene involves specific issues.

- A fire scene is an extremely dangerous area to work. Consider having a firefighter assigned to your team for the sole purpose of ensuring safety at scenes.
- Need for further investigation is after based on the autopsy determination of cause of death. Do not release the scene until the autopsy results are issued.
- Examine the scene to determine whether the immediate area around the victim was consumed by fire. An area of destruction not in proportion to the rest of a fire scene may indicate an attempt to burn the body or a fire started by the victim.
- Photograph the removal of the debris atop the body in detail, layer by layer.
- All debris removed from the area atop and beneath the body should be sifted for evidence of another possible cause of death (gunshot, knife, ligature, etc.).

- Thoroughly photograph and document the exposed body. Photography of burned remains is very difficult due to the lack of contrast.
- Complete body processing steps described in Chapters 1 and 2.
- After the body is removed, photograph the area from which it was removed.
- Collect samples below and immediately adjacent to the body for accelerant detection.
- Document locations of all exits and potential exit routes and their conditions (locked, unlocked). Note indications that an escape route may have been blocked.

Body

Burns are classified according to the depth of tissue damage.

First Degree Burns

- First degree burns are superficial (Figure 21.1).
- Damage is limited to the outer layer of skin and has a reddish appearance.

Second Degree Burns

- Second degree burns are red and often show blistering (Figure 21.2).
- The upper layers of the skin are damaged.
- These burns usually heal without scarring.

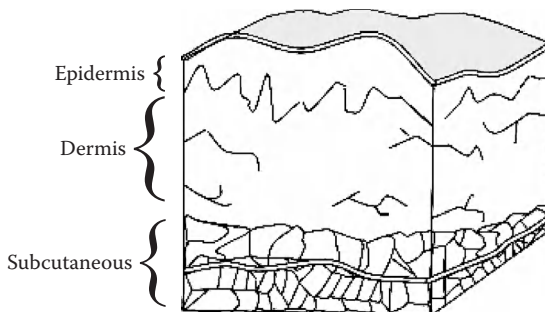


Figure 21.1 First degree burns.

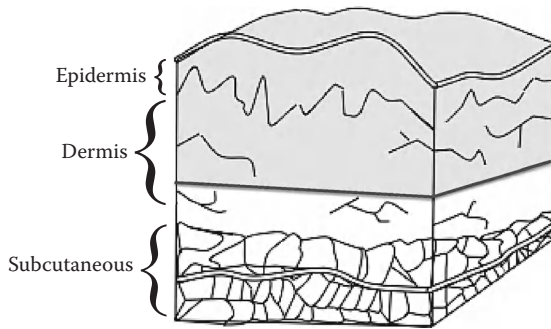


Figure 21.2 Second degree burns.

Third Degree Burns

- Third degree burns damage the entire thickness of the skin (Figure 21.3).
- The skin may appear white and leathery or black and burned.
- These burns heal with scarring.

Fourth Degree burns

- Fourth degree burns extend beyond the skin into the tissues below.
- Complete charring of tissue and destruction of skin and underlying tissue occur.

Deaths from Fire-Related Injuries

- If a body is not burned, proceed as you would with any other type of death.

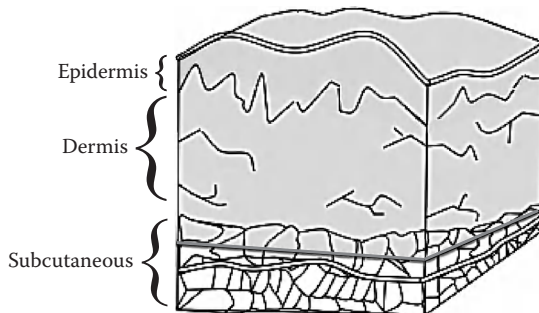


Figure 21.3 Third degree burns.

- Deaths attributed to fire are caused by asphyxia due to smoke inhalation and thermal tissue injuries. Death may be immediate or delayed.
- Immediate deaths are the results of burns or smoke inhalation.
- Delayed deaths may occur even months after the fire and are usually caused by shock, fluid loss, infection, or respiratory failure.
- A fire victim may appear in a defensive posture like a boxer—arms in front of the chest and face. The position is called the pugilistic stance and results from muscle reactions to extreme heat. It is a natural characteristic of death by fire, not an indicator that the victim was trying to protect himself or herself before death.
- Fractures of the extremities of fire victims may be caused by excessive shrinking of the muscles.
- Heat fractures of the skull can appear as cracks on both sides of the head above the temples.
- Steam pressure in the cranial vault may cause breakage of the skull and the protrusion of brain tissue.
- At autopsy, the presence of soot inside the airway is an indicator that the person was alive at the time of the fire.
- X-rays should be taken of burned bodies before autopsy.
- Blood samples must be taken to establish carbon monoxide concentration in the blood.

Electrocution is the death or injury resulting from contact with an electrical source that transmits a flow of electricity through the body. Deaths and injuries caused by electricity are rare and usually accidental. However, safety concerns often require thorough investigations of the circumstances that caused deaths and injuries.

Scene

- Ensure that the power source is turned off before you approach an electrocution scene. This is best accomplished by trained electrical personnel.
- Process the scene in accordance with the guidelines in Chapters 1 and 2.
- Low voltage cases usually involve household appliances or electrical cords. An examination of the suspect device is essential for a thorough investigation. Some cases may require a team approach involving an assisting pathologist, investigator, and a qualified electrician.

Body

- High-voltage electrocutions (those involving more than 1,000 volts) usually present extensive burns and are relatively easy to identify.
- Low-voltage electrocutions (fewer than 1,000 volts) often result from contact with household current (110 to 120 volts). No visible injury may be evident.
- A lightning strike may cause a noticeable fern-like pattern on the skin.
- The path of electricity through a body runs from the point of contact to the point of grounding. For example, if a person handles a “live” wire, the electricity will run from his hand, through his body along major arteries, and exit at a foot or both feet.

- The presence of electrical burns depends on the voltage, amount of current flow, area of contact, and duration of contact. Burns may be present at both the entry and exit points of the current. Electrical burns often appear round, whitish, and crater-like, or may resemble second or third degree burns.

**Special
Death Scene
Investigations**

IV

Infants die from diseases, metabolic disorders, accidents, neglect, injuries, and intentional acts of violence. Any of these reported incidents require thorough scene documentation, processing, and analysis following the procedures established in Chapter 6 (Homicidal Deaths) along with the guidelines below. Deaths resulting from physical abuse and neglect are covered in Chapter 24. This chapter focuses on fatal malnourishment and other intentional acts that take infants' lives.

Violent Death

The signs of violent death in an infant, particularly by suffocation or shaken baby syndrome, may be very subtle. Violent deaths are classified separately from deaths resulting from the intentional withholding of nourishment or sudden unexplained infant death syndrome (SUIDS).

Asphyxial

- Caused by “soft” suffocation.
- Victim may exhibit bruised or torn frenulum.
- Pattern injuries on mouth and nose may be visible under alternate light sources.
- A pillow or other soft object may show significant saliva staining under ultraviolet or alternate light sources.

Asphyxial by Entrapment (Rollover)

- Infant entrapment (rollover) by a parent sleeping next to an infant is very rare.
- If suspected, investigate possible obese caregiver or drug or alcohol intoxication.

Shaken Baby Syndrome and Shaken Baby with Impact Syndrome

Shaken baby syndrome describes a variety of findings that result when an infant is forcibly shaken. The medical examiner community does not agree on the activities that cause it. Some believe the shaking must be accompanied by the impact of an infant's head on some surface. Others believe that shaking alone is sufficient. In suspected cases, coordinate the scene analysis and additional searches with the guidance of the medical examiner.

- Death is usually the result when a frustrated caregiver is unable to settle a crying or screaming infant.
- Death is not instantaneous. A period of listlessness during which the brain reacts to traumatic injury is followed by the critical cascade of events that lead to death.
- Medical treatment is often sought when an infant appears listless or cannot be awakened.

Medical Findings

- Retinal hemorrhages are small bleeding events seen on the surface of the retina of the eye. They are often medically documented during treatment of injuries before the victim's demise.
- Subdural or subarachnoid hemorrhages occur when blood escapes into the layer between protective coverings of the brain or between the brain and its closest protective layer.
- Edema (swelling) of the brain.
- Cerebral contusions (bruises) of the brain.
- Cerebral infarction, deprivation of blood to an area of the brain due to a disturbance in blood flow.
- These injuries may exist despite few or no external signs of trauma.
- Bruising to the chest and back may occur from the fingertips of the perpetrator as he or she gripped and shook the infant. Consider swabbing the bruises for touch DNA and measuring their orientation to each other and the body to determine the finger spread. Suspects may be eliminated by not meeting the finger spread measurements.
- Rib fractures may accompany the event as the infant's chest is most often encircled by the perpetrator's hands and forcefully shaken.
- Injuries resulting from violent shaking or pulling of the limbs may be present.

Failure to Thrive

Organic Causes

- Certain diseases and hereditary conditions prevent an infant from being able to metabolize nutrients.
- Infant may have diagnosed medical condition.
- Medical records will indicate failure of the infant to thrive under medically supervised feeding.
- Home will reveal evidence of medical treatment, records, and attempts at intervention.
- No indications of neglect will be present.
- Infant will present as emaciated and clean.
- Living conditions will not reflect neglect (may reflect poverty).
- Typically the death will occur under medical supervision and be certified as natural by the treating physician.
- Autopsy may reveal a physical condition, disease, or deformity inhibiting the infant's ability to metabolize age-appropriate food.

Neglect

- Failure to meet base level of nutritional needs of an infant.
- Seldom affects toddlers. A child who can move about often develops foraging skills.
- Often demonstrated by infant's ability to thrive in a medical environment.
- May also result from a caregiver with diminished capacity or a failure to understand and/or follow nutritional guidance.
- Failure to thrive from withholding of nutrition is rarely an isolated behavior; search for other indications of neglect.
- Infant will present as emaciated and most likely show other physical signs of neglect. The infant may be filthy, have severe diaper rash, or other signs not consistent with a nurturing environment.
- Living conditions will often demonstrate neglect.
- Few or no age-appropriate foods or nutritional supplements will be present in the home.
- Autopsy will reveal no medical condition that would inhibit the infant's ability to metabolize age-appropriate food.

Sudden Unexplained Infant Death (SUID)

Sudden, unexplained infant deaths (SUIDs) are cases in which no cause of death was obvious at the time of the demise. SUID occurs in infants under 1 year of age and remains unexplained after a thorough investigation. The risk for SUID peaks at 2 to 4 months of age and 90% of SUID deaths occur in children younger than 6 months. For investigative purposes, SUID deaths are handled as homicides (Chapter 6). Special guidance is provided below. SUIDs may only be diagnosed after:

- Performance of a complete autopsy that rules out all other causes
- A thorough death scene examination (Chapter 6)
- A complete review of the infant's medical and clinical history

Appendix E is an SUID scene worksheet. The form is not copyrighted and is available electronically from the Centers for Disease Control (CDC): www.cdc.gov/SIDS/SUIDIRF-EV.htm

The worksheet covers investigative details, witness interviews, infant medical and dietary histories, mother's pregnancy history, incident scene investigation, investigator's summary and diagrams, and a pathologist's summary section. Risk factors associated with SUIDs include:

- Breast feeding
- Exposure to tobacco smoke
- Sleeping prone
- Male sex
- Low maternal education
- Young maternal age
- Single mother
- Late or no prenatal care

Victim

Specific information should be obtained related to circumstances surrounding a suspected death from SUID:

- Age of victim
- Race of victim
- Ethnicity of victim
- Date and time of notification of emergency personnel
- Person or organization that notified emergency personnel

- Condition of infant when discovered (dead, unconscious, in distress)
- Sequence of events before death
- Evidence of injury
- Position of infant when found
- Position of infant when last seen alive
- Resuscitation attempts made by relatives, EMS, others
- If injury is noted, consider utilizing scene procedures from Chapter 14 (Asphyxiation) and Chapter 16 (Blunt Force Injuries)
- Document scene in accordance with Chapter 15

It is also essential to obtain a complete medical history and copies of appropriate documentation to ascertain:

- Problems during labor or delivery
- Maternal illness or complications during pregnancy
- Major birth defects
- Hospitalization of infant after initial discharge
- Emergency room visits in 2 weeks preceding death
- Known allergies
- Whether growth and weight gain were considered normal
- Exposure to contagious diseases in 2 weeks preceding death
- Illnesses in 2 weeks preceding death
- Whether infant ever stopped breathing or turned blue
- Whether the infant was breast fed
- Vaccinations in 72 hours preceding death
- Deceased siblings and circumstances of their deaths
- Medication history
- Number of smokers in household

Scene

The death scene is an essential component of a thorough investigation of SUIDs. Information gathered during the scene investigation augments information obtained from an autopsy and review of clinical and medical history, and aids the medical examiner to determine the cause and manner of death.

- Is the death scene the primary residence of the infant?
- If the infant was discovered after being put down to sleep, was he or she sleeping in a primary or usual sleeping location?
- Is the death scene a day care or child care setting?
 - How many children were in the care of the provider at the time of the death?

- How many adults were supervising the children?
- Were any youth supervising the children? How old were they?

Fully describe and document the following at the scene:

- Heating and cooling sources. Were they operating? What were their settings?
- Were windows opened or closed? Was a fan operating in or near a window?
- The temperature of the room where the infant was found. Determine thermostat setting, thermostat reading, room temperature, and outside temperature.
- Any observed mold growth, excessive dampness, or standing or dripping water. Preserve samples of mold, standing water, and dripping water.
- Indications of insect or vermin infestation.
- Peeling paint.
- Odor of cigarette smoke.
- Unusual smells or fumes.
- Electrical cords or wires near or contacting crib or sleeping surface. Exercise extreme caution; check for stray voltage and ensure breaker has not tripped.
- Was the room recently painted? Have all associated fumes dissipated?
- Are alcoholic beverage containers or drug paraphernalia present?
- Determine source of drinking water at scene and preserve a sample.
- Fully describe, document, and collect the following items of evidence:
 - Sleeping or supporting surface
 - Clothing including diapers
 - Other items in contact with infant (pacifiers, dangling toys, bumper guards, etc.)
 - Items in crib or immediate environment
 - Electrical and mechanical devices operating in room
- Room temperature; cooling and heat sources

Dietary History

- Who was the last person to feed the infant? Collect remaining food or formula.
- What is the relationship of the feeding person to the infant?
- What foods and liquids were fed in the last 24 hours? Collect samples of all foods and liquids if possible, for example:
 - Breast milk
 - Formula

- Cow's milk
- Water
- Juices or teas
- Solids
- Other
- Were any new foods introduced in the last 24 hours? Describe them and collect samples.
- Was the infant last placed to sleep with a bottle? Collect bottle and contents.
- Was the bottle propped? If so what was used to prop the bottle?
- Did death occur during breast feeding? Bottle feeding? Eating solid foods?

Medical History

- In the 72 hours, before death, did the infant have:
 - Fever
 - Excessive sweating
 - Lethargy or sleeping more than usual
 - Decrease in appetite
 - Vomiting
 - Choking
 - Diarrhea
 - Stool changes
 - Difficulty breathing
 - Apnea (stopped breathing)
 - Cyanosis (skin turned blue or gray)
 - Seizures or convulsions
 - Other medical condition
- In the 72 hours prior to death, was the infant injured?
- In the 72 hours prior to death, was the infant given vaccinations or medications?
- Did the infant have a history of:
 - Allergies (foods, medications, other)
 - Abnormal growth or weight gain or loss
 - Apnea (stopped breathing)
 - Cyanosis (skin turned blue or gray)
 - Seizures or convulsions
 - Cardiac (heart) abnormalities
 - Metabolic disorders
 - Other observed medical condition

- Describe the infant's two most recent visits to a physician or health care provider.
- What were the infant's length and weight at birth?
- Was the infant born early, late, or when expected?
- Was the infant a singleton, twin, triplet, or other multiple birth?
- Did any complications occur during delivery or at birth?
- Have there been previous infant deaths in the family?

Mother's Pregnancy History

- Is mother of the infant his or her birth mother? If she is not, attempt to find and interview the birth mother and/or review her pregnancy medical history.
- For how many weeks or months did the mother participate in prenatal care?
- Where did the mother receive prenatal care?
- During pregnancy or birth, did the mother suffer any complications?
- Was the mother injured during pregnancy?
- During pregnancy did the mother use:
 - Over-the-counter medications
 - Prescription medications
 - Herbal remedies
 - Cigarettes
 - Alcohol
 - Other
- Did the mother or other caregiver at the time of the death use:
 - Over-the-counter medications
 - Prescription medications
 - Herbal remedies
 - Cigarettes
 - Alcohol
 - Other

Child and Infant Deaths 24

Physical Abuse and Neglect

Certain types of traumas and injuries are associated with child and infant abuse. Fatal abuse episodes are often reported as accidental deaths. Falls, accidental immersion burnings while playing with bathtub faucets, entrapments in toys and furniture, or sleeping mothers who roll over and suffocate infants are commonly reported. All such incidents require thorough scene documentation, processing, and analysis following the procedures in Chapter 6 (Homicidal Deaths) supplemented by the guidance in this chapter.

Scene

Weapon or Item Used to Inflict Injury

- Seize any items that may have been used to inflict injury: weapons, belts, coat hangers, wires, cords, etc. These items often leave distinct pattern injuries on the victim's body.
- If the object associated with the injury cannot be found, conduct an expanded search of the area. Focus on the likely paths of travel by the perpetrator and nearby dumpsters, bodies of water, and roofs of buildings.
- If restraints were used (ropes, belts, tape, clothing, etc.) to bind the victim, seize the items and protect them for the recovery of trace and other evidence. Knots and overlapped areas of tape should not be cut through or untied.
- Search for, examine, and recover other items that may link a suspect to the crime and/or death scene or corroborate the reports of the event by victims, suspects, and witnesses.

Burns, Scalds, Immersion Burns

- Consider taking the temperature of hot water from the faucet in cases involving scalds, splash burns, or immersion burns. Also, note the temperature setting of the hot water heater. These procedures and steps are detailed in the Appendix D immersion burn worksheet.
- Look for items that are consistent with pattern burn injuries on the child.
- Look for skin on the surfaces of objects used to dry-burn the victim.

Falling Injuries and Staged Accidents

- Take measurements of furniture, stairs, and equipment if a case involves falling type injuries or claims that the victim fell accidentally.
- Check for indications that a death scene accident was staged.

Neglect

- Consider examining a scene in conjunction with a state or local child welfare professional.
- An unkempt home, dirty living conditions, and absence of toys or child furnishings may be indicative of child neglect. Physical abuse and neglect often go hand in hand.
- General living conditions:
 - Dirty living environment
 - Evidence of poor housekeeping
 - Overcrowded living conditions
 - Inadequate child safety measures
 - Lack of items normally associated with child care
 - Infestation by roaches, other insects, and vermin
- Child's sleeping area:
 - Dirty living environment
 - Lack of or inappropriate bed or bedding
 - Lack of or inappropriate clothing
 - Failure to properly dispose of soiled diapers and clothing
 - Presence of roaches, insects, or vermin: turn off the lights; wait about 10 minutes; turn the lights back on; photograph insects or vermin present
- Food preparation and eating area:
 - Dirty food preparation and eating environment
 - Unclean dishes and cooking equipment
 - Left-over food not properly discarded
 - Presence of roaches, insects, or vermin
- Kitchen cupboards, pantries, refrigerator:
 - Lack of or inappropriate food supplies
 - Dirty food storage areas
 - Spoiled or rotting food
- Consider seizing relevant items to demonstrate victim's living conditions.

Body

Because of the undeveloped nature of children's skeletal and muscular systems, child injuries often manifest themselves differently from injuries to adults. Certain types of injuries are common to child abuse cases and should be considered suspicious, especially in the absence of clinical history or when the history given is inconsistent with the injury.

Skeletal System Injuries

- Bone injuries that appear out of proportion to the clinical history provided, especially rib fractures, skull fractures and long bone fractures
- Multiple fractures at different stages of healing that may indicate multiple incidents of physical abuse over time
- Combination of skeletal and soft tissue injuries

Skin and Subcutaneous Tissue Injuries

- Abusive injuries commonly appear in areas not usually involved in accidental falls of childhood—fleshy body parts such as the arms or legs, buttocks, abdomen, inner thighs, face, mouth, cheeks, genitals, or the back above the buttocks (Figure 24.1).

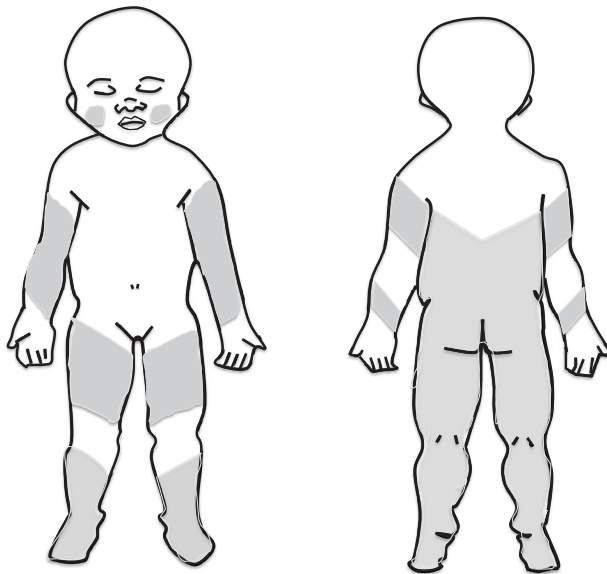


Figure 24.1 Suspicious location for an accidental injury.

- Multiple injuries in various stages of healing may indicate repeated beatings. Children who fall and injure themselves accidentally usually have bruises on the bony prominences—chin, forehead, elbows, knees, and shins.
- Insect or other bites indicative of infestation of the living environment.
- Severe diaper rash, uncleaned, untreated sores, and other indicators of failure to provide basic hygiene.
- Examine contents of soiled diapers, training pants, or underwear worn. If insect eggs or maggots are present or associated with injuries, collect the entomological evidence (Chapter 36). It may provide an indication of the duration of neglect.

Immersion, Contact, and Cigarette Burns

- The shapes and locations of these injuries are important for distinguishing accidental and non-accidental burns.
- Accidental burns are usually asymmetrical, random, and most often on the hands, chest, and legs. They usually are devoid of patterns and poorly defined.
- Inflicted burns are usually well defined and symmetrical (Figure 24.2).
- Immersion burns frequently occur over both legs and can extend to the abdomen. The burn pattern may resemble a glove over the hands

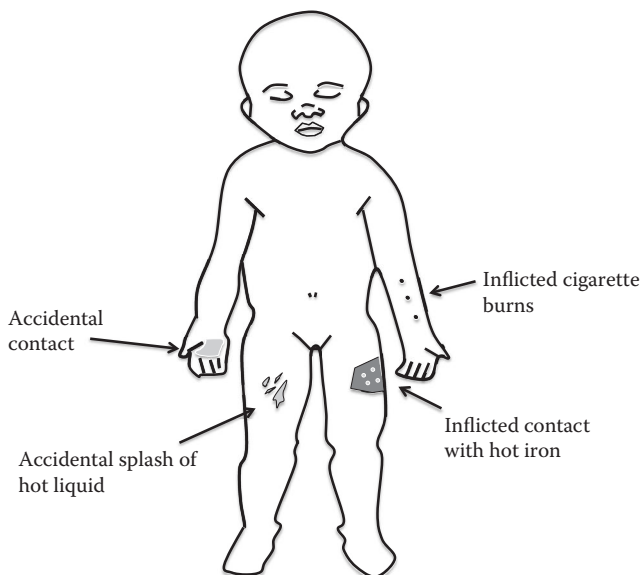


Figure 24.2 Accidental versus inflicted burns.

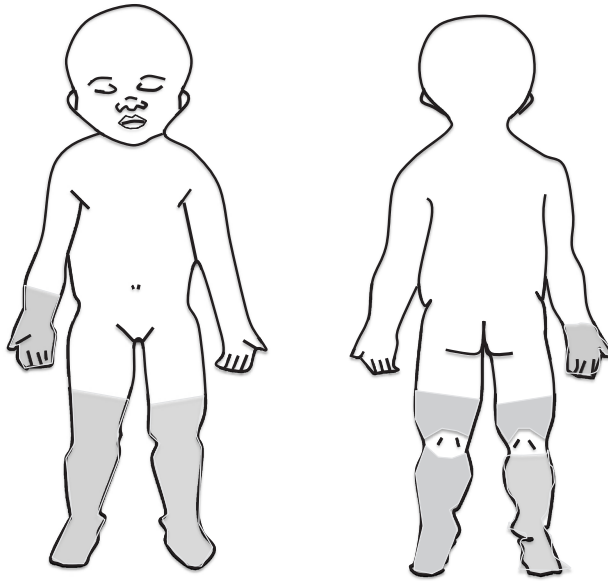


Figure 24.3 Immersion burns.

or a sock over the feet. The knees and popliteal spaces (areas behind the knees) are typically spared as the child may flex his legs when contact is made with the hot water (Figure 24.3).

- Pattern burns result from contact with hot surfaces such as stove burners and irons. Typical locations are the back, forearms, and buttocks. During scene examination, search for an object that may have produced the pattern.
- Accidental cigarette burns are not uncommon. However, multiple cigarette burns and burns in various stages of healing are almost always indicative of abuse.

Head and Central Nervous System Injuries

- A torn frenulum in the mouth is almost always caused by abuse and generally occurs from the forcible insertion of an object into the mouth, striking the child across the face, or smothering (Figure 24.4). The frenulum is the small fold of tissue between the gums and lip that prevents the lips from extending too far away from the mouth (you can easily observe your frenulum in a mirror by raising your upper lip).
- Have the victim examined for the presence of retinal hemorrhages to determine the possibility of forcible repeated shaking prior to death. At autopsy, the pathologist should investigate possible detached retinas.

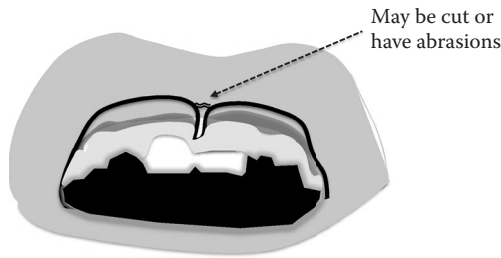


Figure 24.4 A torn frenulum is almost always indicative of abuse.

- Scalp bruises and bald patches on the head are common signs of abuse.
- Shaken baby syndrome is a general term that covers a variety of findings: retinal hemorrhage, subdural or subarachnoid hemorrhage, edema, cerebral contusion, cerebral infarction, rib fractures, and injuries resulting from violent shaking or pulling of the limbs. Despite these injuries, the victim may show few or no external signs of trauma.
- The medical examiner community continues to disagree about shaken baby syndrome. Some believe it must be accompanied by impact of the victim's head on some surface during the shaking episode. Others believe that shaking alone is sufficient. Coordinate scene analysis and search details with the guidance of the local medical examiner.

Chest and Abdominal Injuries

- **Rib fractures** — Significant force is needed to fracture ribs of infants and children. Rib fractures should be considered suspicious.
- **Abdominal injuries** — Bruises over the abdomen are uncommon even in cases of major abdominal injuries.

Autopsy

In addition to standard autopsy documentation, photography, and evidence collection, consider the following:

- Full body x-rays (bone survey) should be requested for any suspected physical child abuse death.
- During close-up photography of injuries, white balance and a color card should be used to ensure the most accurate color rendition on final prints.

- Consider requesting ultraviolet or infra-red photography to enhance the visibility of pattern injuries or older bruising.
- Bruises and bite marks should be photographed several times over several hours with and without ultraviolet and infra-red light to maximize possible pattern recognition.
- Bite marks should be processed as soon as possible (Chapter 40). Preservation of bite marks should be discussed with the medical examiner.
- Fully describe and collect the victim's clothing.

Additional Questions for Medical Examiner

- What type of weapon may have caused the injuries?
- Are injuries consistent with the care provider's account of the incident?
- Are the injuries likely to have resulted from accidental or inflicted trauma?
- If weapons or items suspected of having inflicted the injuries are available, ask the physician to compare them with the injuries. If they are not immediately available, return to the medical examiner for an opinion after the weapon or implement is discovered. Ensure the item is protected to preserve friction ridge and touch DNA evidence before handling!
- Is it possible to date (even approximately) fractures and bruising? If not, can the medical examiner determine whether they occurred at different times?
- Ask for an opinion about the causes of injuries. Determine what weapons, if any, may have inflicted the injuries. Determine whether the injuries are consistent with the history given by care providers, family members, suspects, and witnesses. Ask the physician whether the injuries are consistent with accidental or non-accidental trauma.
- Request a specific opinion about indications of physical child abuse. If abuse is indicated, are the injuries associated with the abuse fatal or did they lead to death?

Medical Records Review

A thorough review of all medical records must be conducted in any case where physical child abuse is suspected.

- Any statements made to medical providers by parents or care providers about recent or past injuries should be thoroughly documented.
- To avoid detection of multiple incidents of abuse, a caregiver may have used different medical facilities. Insurance records, Medicaid records, and medical bills found at the scene may provide names of relevant health care providers.
- Injuries documented during autopsy, healing burns, and old fractures may not be covered in medical records. Failure of a caregiver to seek treatment may have been an attempt to avoid detection.
- If the child is old enough to attend day care or school, frequent absences or reports of accidents to explain injuries should be documented.

Child Deaths

Sexual Abduction and Murder

25

Child abduction for the purposes of sexual assault is often followed by murder. In rare cases, a child is abducted for the purpose of serving as a long-term sexual captive of the perpetrator. This chapter will focus on the abduction scene, the site of the sexual assault, the scene of the murder, and the scene where the body was discovered.

Abduction

Often a kidnapping or missing persons report will not involve an identifiable scene. The act may have taken place on a city street, playground, or other public area. In such cases, a thorough neighborhood canvassing and interviews may provide the only details about the act. If a struggle was suspected, the area of the struggle should be processed in the same manner as any violent assault scene.

Missing Child Report

- A child murder case may start as a missing child investigation. Check the residence, neighborhood, and surrounding areas for potential hiding spots.
- In a missing person investigation, a note of intent to leave home or run away may be present. Any notes should be collected and processed as questioned documents to ascertain their authenticity.
- A thorough search of the victim's personal effects, residence, and place last seen should be conducted to locate leads and evidence, identify friends and relatives of the victim, telephone numbers, and places frequented.
- Obtain the most recent photograph of the victim.
- Consider collecting the toothbrush of the victim and known samples of head hair from a hairbrush or pillow at the residence. Such evidence should be taken and packaged for possible future DNA identification. If this step is not handled tactfully, it may produce adverse emotional impacts on the victim's relatives.

Scene

- In a confirmed stranger abduction case, immediately consult agency policy for issuance of an “Amber Alert.”
- All available videotapes of the suspected abduction location and avenues of approach and egress from the scene must be immediately seized and reviewed.
- Through scene analysis and a review of videotapes, determine whether the suspect may have handled objects at the scene; process such objects for latent prints and touch DNA testing.
- Through scene analysis and a review of videotapes, determine whether the suspect may have left evidence suitable for DNA processing (cigarette butts, chewing gum).
- Through scene analysis and a review of videotapes, determine whether the suspect left two- or three-dimensional footwear impressions or tire marks.
- Through scene analysis and a review of videotapes, determine whether the suspect dropped or discarded in waste cans or elsewhere any items that might aid in his or her identification.

Sexual Assault

If a scene where the victim was suspected to be held, sexually assaulted, and/or murdered is identified, follow the Chapter 6 guidelines for homicide scene processing and:

- Thoroughly search for biological stains, particularly semen and blood.
- Identify any item that may have been used to restrain the child and may yield DNA, fingerprint, or trace evidence.
- Identify any item that may have been used as a gag and may yield DNA, fingerprint, or trace evidence.
- Search for age-inappropriate items (toys, children's clothing) at the scene if all the primary residents are adults.
- Search for cameras and recording devices.
- Search for a hidden area containing souvenirs from victims.

Searches Related to Pedophile

Search the location where the sexual assault occurred. Also, search outbuildings, sheds, garages, automobiles, attics, basements, storage facilities, post office boxes, and work spaces. Look for the following types of evidence:

- Cameras and video equipment intended for taking, producing, or reproducing photographic images: cameras (instant developing, 35 mm, digital), video production equipment, photographic printing equipment, lenses, enlargers, photographic papers, films, and developing chemicals.
- Phone books, phone registers, calendars, correspondence, lists of names, addresses, or phone numbers that identify the victim and other juveniles. This information may be found on computer hard drives or disks or may be encrypted on a computer. Remember, common gaming consoles may be used to store digital data.
- Photographs, movies, slides, videotapes, computer images, negatives, drawings, and undeveloped films that identify the victim and other juveniles and adult. Such information may be encrypted on storage media.
- Computers, thumb drives, storage devices, and disks intended for recording, producing, or transferring photographic images, data, or correspondence related to the victim.
- Correspondence, diaries, calendars, and other writings; tape recordings; letters relating to juveniles or adults that reveal identities and show sexual conduct between juveniles and/or adults. This information may be saved on computer hard drives or disks or encrypted on storage media.
- Magazines or books depicting nudity or sexual activities; collections of newspaper, magazine, and other clippings of juveniles that demonstrate particular sex and age preferences of the suspect; child erotica, “art” collections, dance, ballet, gymnastics, and cheerleading photos. Such information may be encoded on a computer.
- Sexual aids such as rubber penises; dildos of various sizes and types; vibrators; lubricants; condoms; and bondage gear.
- Articles of personal property (locks of hair, panties, barrettes); toys; drawings; and other items belonging to or made by the victim.
- Safe deposit box keys, bank statements, billings, and checks that show the locations of safe deposit boxes and storage facilities of any person involved in the sexual exploitation of children through molestation, pornography, or prostitution. The items may be found in file cabinets, mailing envelopes, or delivered mail.
- Indicators of occupancy such as personal property that establishes the identity of the person or persons in control of the premises where the sexual assault occurred. Examples are rent receipts, delivered mail, keys, and utility bills. This evidence is important when occupancy is questioned or disputed.

- Evidence of pedophile organization membership such as the North American Man-Boy Love Association (NAMBLA), Rene Guyon Society, Diaper Pail Fraternity (DPF), and others. Examples are newsletters, check stubs, credit card receipts for dues payments, bills for memberships, applications and phone records.
- Evidence of computer site visitations to areas depicting or advertising adult pornography meant to simulate child pornography. This investigation requires a qualified computer forensic investigator!
- Evidence of the suspect's participation in legitimate youth organizations and activities.
- The suspect's work and attendance records.
- Peepholes, drop ceilings, and hidden cameras and compartments.

Murder

Specific guidance for steps in securing the scene, photography, and initial death scene procedures are covered in Section I (Death Scene Investigations).

- Consider securing the scene and delaying its processing (after processing perishable evidence) until results of medico-legal examination are available.
- Begin documentation via notes, sketching, and photography. Documentation should be ongoing.
- If the suspect is not a member of the household, examine paths of entry, exit, and the area of the incident for two- and three-dimensional footwear and/or tire impressions.
- Clothing, bed linens, rugs, and car seats may contain hair, blood, semen, and fiber evidence. Process these areas for biological and/or trace evidence.
- If the suspect does not live at the murder scene and items of clothing and bedding were laundered, consider examining the lint from the washer and dryer for trace evidence.
- Use an alternate light source to detect biological evidence and fibers.
- Pay special attention to bathrooms since a suspect may clean up after a sexual assault. Washcloths, towels, and tissues may contain biological evidence residue.
- Any clothing, particularly underwear or diapers worn by the victim, should be seized.

- If the suspect is not a member of the household, process logical areas for impression and latent print evidence.
- Search for all evidence that corroborates or refutes witness or suspect statements.

Body Recovery

The search for and recovery of the body should follow the procedures discussed in Section II (Recovery of Remains).

Evidence on Body

- If the body is still at the scene of the murder, request attendance by a sexual assault response team (SART) and a medical examiner.
- Inform the medical examiner of allegations, suspicions, or scene indications of vaginal or anal penetration (penile, digital, or other), recent oral penetration, fondling, and biting or other physical injuries. Physical evidence on the body should be shown to the examiner.
- Discuss swabbing for touch DNA analysis on areas of the body likely to have been handled to facilitate the sexual assault, murder, and disposal of the body. This must be done before substantial manipulation of the body by the medical examiner's staff.
- Request an examination of the body with and without clothing, using an alternate light source (ALS) to detect biological fluids and other trace evidence such as lubricants, lotions, fibers, and hairs. Refer to Chapter 37 (Biological Evidence).
- If an ALS is not available, use an ultraviolet (UV) light. Such lights are commonly used at medical facilities and called Woods lamps.
- Discuss the sexual assault examination with the medical examiner before the examination proceeds; ensure that a prepared victim sexual assault kit approved by the servicing crime laboratory is used.
- Evidence associated with a sexual assault is perishable and should be collected as soon as possible.
- Ensure that the victim's clothing is collected, protected for trace evidence, and separately packaged.
- An examination using a colposcope may help locate microscopic injuries in the vagina and anus. This instrument can be used to

better view bruises, tears, and scars. A camera can be attached to the colposcope to produce excellent documentation.

- If vaginal penetration is alleged or suspected, have the condition of the hymen evaluated and documented.

Examination of Suspect

- Appropriate authorization should be requested to conduct a physical examination of a suspect for evidence purposes.
- Generally, if fewer than 72 hours have elapsed since the reported incident, arrange for a medico-legal examination of the suspect using a prepared sexual assault examination kit approved by the servicing crime laboratory. This should include, at a minimum, combed and plucked pubic and head hairs, blood, saliva, penile swabs, and fingernail scrapings. All physical injuries should be completely documented.
- Generally, if more than 72 hours have elapsed since incident was reported, arrange for a medico-legal examination of the suspect using a prepared sexual assault examination kit approved by the servicing crime laboratory. This should include, at a minimum, combed and plucked pubic and head hairs, blood, and saliva.
- Any statements made to medical personnel about the incident should be thoroughly documented.
- Collect the clothing the suspect was wearing during the incident. Use the procedure described for processing clothing of victims.

Sexual Activities Resulting in Death

26

A wide range of sexual activities and practices may lead to death. A natural death may occur when the cardiovascular system cannot support the physical endeavor. Death may result from a mishap during solo sexual activity or from an inadvertent act of a sexual partner. Unfortunately sexual deaths may be caused by intentional criminal acts. A thorough investigation is often the only way to distinguish between consensual sexual activity and a criminal act.

Natural Death during Coitus

Intercourse is a physical activity that often places great demands on the cardiovascular system. An individual prone to heart attack or stroke may succumb as a result of the exertion of intercourse.

Body

- No signs of struggle or criminal activity outside the scope of the sexual activities.
- Natural death will be confirmed through pathological findings at autopsy.

Scene

- No signs of struggle or indications of criminal acts.
- Personal effects at scene may indicate medical treatment for cardiovascular disease.

Accidental Death during Autoerotic Asphyxia

Autoerotic asphyxia is state of hypoxia self-induced during masturbation for the purpose of intensifying orgasm.

Body

- Physical findings are covered in detail in Chapter 14 (Asphyxial Deaths).
- The practitioner of autoerotic hypoxia often dresses in women's clothing, lingerie, or bondage-related clothing (masks, hoods, gags).
- He or she is often involved in bondage to intensify the fantasy and may be tied, cuffed, gagged, or otherwise bound.
- Generally a ligature around the neck will be padded to prevent marks.

Scene

- Family members who discover the body may alter the scene before responders arrive. Alterations usually include removal of inappropriate clothing, accoutrements, sex toys, and pornography.
- The scene may show indications of multiple uses, such as eye rings used for suspension or abrasions on wood at suspension points.
- An escape mechanism or strategy for the practitioner must be available. It may be elaborate or as simple as a device on which to stand to relieve the constriction around his or her throat.

Homicide: Sexual Asphyxia by Partner

Face Sitting and Breath Control

Consensual face sitting is a form of breath control usually employed by a dominant female partner. The female partner obstructs her partner's airway by sitting or squatting over him and lowering her buttocks over his mouth and nose. The hypoxic episode is often repeated with varying pressure and duration. Variations of breath control include occluding his mouth and nose with her hand. The dominant nature of this sexual practice leaves the re-establishment of the airway at the discretion and judgment of the dominant partner. A failure in judgment could be fatal.

Body

- The physical findings associated with this death are covered in detail in Chapter 14 (Asphyxial Deaths).
- Smothering may leave no external signs of injury.
- The victim's face may show an injury pattern consistent with the fabric patterns or seams of the dominant partner's clothing worn around the buttocks area.
- Trace evidence may be detected around the nose and mouth.

Scene

- Evidence may indicate a dominant sexual episode including bondage.
- The victim's hands may have been restrained to prevent him or her from interrupting the episode.
- The dominant partner's clothing, particular around the buttocks area may be stained with the victim's saliva.
- The victim's computer may contain files pertaining to sexual hypoxophilia.
- The victim may have movies or literature relating to sexual hypoxophilia.
- Rough Sex and Breath Control.

Consensual rough sex satisfies the demands for one partner to produce a hypoxic state for the other partner. If the partner whose actions block the other's airway fails to recognize when a critical hypoxic state has been reached, death may occur. Investigation of this type of incident should consider it a homicide. Only through protracted interviews, analysis of scene indicators, and the interviews of previous sexual partners may the consensual nature of the acts be established.

Body

- The physical findings associated with this death are detailed in Chapter 14.
- Processing should combine aspects of working a death scene and a sexual assault scene.
- An on-scene examination of the deceased by a sexual assault response team (SART) is recommended.

Scene

- Because the death may have resulted from consensual activity that normally leads to near incapacitation, the scene may reveal no signs of struggle or violence.
- The scene may include commercial or home-made bondage or S&M equipment.
- In erotic hypoxophilia play, the presence of soft bondage and discipline equipment (paddles and whips) is not unusual.

Sexual Assaults Resulting in Death

27

This chapter covers murder investigations that involve elements of sexual assault, rape, or torture. The murder may be planned as a part of the act or not planned and accomplished in response to a particular set of circumstances (unexpected or planned use of deadly force, inability to render the victim compliant, fear of discovery, and other factors). The motive of the offender is often used to categorize these crimes. The classification of the sexual assault and/or murder based on suspect motivation and profile is best done during the conduct of the investigation rather than as an initial crime scene approach. This chapter focuses on the scene processing and analysis phase of a sexual murder investigation.

Examination of Victim

If possible, have a sexual assault response team (SART) respond to the scene to process the body for evidence of sexual assault and minimize the opportunity for evidence to be lost during transit or over time.

Sexual Assault Evidence

- If the body is still at the murder scene, request that a SART and medical examiner respond.
- Inform the medical examiner of allegations, suspicions, or scene indications of vaginal or anal penetration (penile, digital, other), recent oral penetration, fondling, biting, and other physical injuries. Indicate any physical evidence on the body to the examiner.
- Discuss swabbing for touch DNA testing on body areas likely to have been handled to facilitate the sexual assault, murder and disposal of the body. This must be done before substantial manipulation of the body by medical examiner personnel.
- Request an examination of the body with and without clothing using an alternate light source (ALS) to detect biological fluids and other trace evidence such as lubricants, lotions, fibers, and hairs. Refer to Chapter 37 (Biological Evidence).

- If an ALS is not available, ultraviolet (UV) light should be used. Such lights are commonly used by medical facilities and called Woods lamps.
- Discuss the sexual assault examination with the medical examiner before the examination proceeds. Ensure the examination is conducted using a prepared victim sexual assault kit approved by the servicing crime laboratory.
- Sexual assault evidence is perishable and should be collected as soon as possible.
- Ensure that the victim's clothing is collected, protected for trace evidence, and separately packaged.
- An examination using a colposcope may be helpful for finding microscopic injuries in the vagina and anus. This instrument can better view bruises, tears, and scars. A camera can be attached to the colposcope to provide excellent documentation.
- Ask the doctor to microscopically examine vaginal and/or anal swabbings for motile sperm.

Physical Assault Evidence

- Take color photographs (with and without scale) of injuries.
- Use a color card to achieve more accurate color rendition on final prints.
- Photos of individual injuries should also be taken with the camera parallel to the body surface and at close range with a scale.
- Consider requesting ultraviolet or infrared photography to enhance the visibility of pattern injuries or older bruising.
- Injuries should be photographed over several hours if possible.
- Ask the doctor what type of weapon may have caused the injuries and whether the injuries are consistent with the victim's account of the assault.
- Bite marks should be processed as soon as possible. Refer to Chapter 40 for processing impression evidence.
- Obtain copies of all associated medical reports.

Examination of Suspect

- Request appropriate authorization for conduct of a physical examination of a suspect for purposes of finding evidence.
- If fewer than 72 hours have elapsed since the reported incident, arrange for a medico-legal examination of the suspect using a

prepared sexual assault examination kit approved by the servicing crime laboratory (combed and plucked pubic and head hairs, blood, saliva, penile swabs, and fingernail scrapings). All physical injuries should be completely documented.

- If more than 72 hours have elapsed since the reported incident, arrange a medico-legal examination of the suspect using a prepared sexual assault examination kit approved by the servicing crime laboratory (combed and plucked pubic and head hairs, blood, and saliva).
- All statements made to medical personnel about the incident should be thoroughly documented.
- Collect the clothing the suspect was wearing during the incident. Use the procedure described for processing clothing of victims.

Examination of Intimate Partner

- Administer a physical evidence recovery kit (PERK) for any party with whom the victim may have had sexual relations and who may have contributed evidence collected during the victim's physical examination.
- The third party should submit to a medico-legal examination using a prepared sexual assault examination kit approved by the servicing crime laboratory (plucked pubic and head hairs, blood, and saliva).

Scene Considerations

The scene should be processed as a homicide in accordance with the guidance provided in Section I. Any identified mechanism of injury should be cross-referenced to the appropriate chapter in Section III. Additional issues include:

- Consider securing the scene and delaying its processing (except for processing perishable evidence) until results of the medico-legal examination are available.
- Begin documentation via notes, sketching, and photography. Documentation should be ongoing.
- Items such as clothing, bed linens, rugs, and car seats may contain hair, blood, semen, and fibers. Process these areas for biological and/or trace evidence.
- If the suspect does not live in the scene residence and items of clothing and bedding have been laundered, consider removing lint from the washer and dryer to test for trace evidence.

- Use of an alternate light source is indicated to detect biological evidence and fibers.
- Pay special attention to bathrooms, as a suspect may clean up after a sexual assault. Washcloths, towels, and tissues may contain biological evidence.
- Search for all evidence that corroborates or refutes witness or suspect statements.

Death Scenes with Multiple Victims

28

Multiple Victims at a Single Location

Multiple victim murders may be perpetrated by one or more attackers. The victims may also include the killers (murder–suicide).

- The scene is often complex with evidence overlapping among victims. For example, bloodstain patterns and spent bullet casings are difficult to attribute to one bloodletting position or one shooting position.
- A high degree of proficiency is necessary to analyze the patterns of multiple positions; such scenes require a well trained and experienced crime scene reconstructionist.
- The victims often have familial, employment, or social connections that place them in the same location at the same time.

Spree Killings

Spree killings generally involve multiple victims at a single location or linked locations. Examples are killings at a shopping mall or school and the killing of co-workers or family members at linked locations such as separate homes or offices. The spree killer generally focuses on revenge or hatred for a group of people from whom they feel disassociated or ostracized. The victims do not have to necessarily be the targeted group; they simply have to be representative of the group.

- Spree killings often involve targeting a group of people who represent an individual or a group that the attacker perceives as causing continual harm or oppression.
- The killer may choose a primary victim who specifically reflects his or her rage, for example, a school administrator or psychologist, and he or she then includes other victims associated with that individual.
- These investigations are often confined to one or two locations at which scene boundaries may be demarcated.

One example of a primary victim is a specific psychologist in a hospital. The spree killing expands to other psychologists, staff members, and random patients until the spree ends by the death of the perpetrator by law enforcement intervention. Another example is an individual who vents his rage against a class of people associated with a shopping mall or other facility that may represent a perceived wrong that festered into rage.

- The investigative advantage to these acts is that they are generally committed by one or two attackers who have deep personal bonds and are contained over time to one or more events separated only by the time necessary to travel between locations.

Mass Murders

Mass murder usually involves state- or terrorist-sponsored activity against an ethnic group or citizens who are perceived as undesirable or dangerous to the sponsoring organization.

- Mass murder scenes generally involve a specific area that allows the killing of hundreds of victims and includes routes and means of transportation of the victims to the killing area.
- The killing area may or may not be separated geographically from the living area of the victims.
- Example of mass murder include the program against the Jews during World War II, the execution of the Muslims in the former Yugoslavia, and the murders of the Kurds under Saddam Hussein's regime in Iraq.
- An investigative factor in investigating a mass execution is that relevant areas are rarely cleaned up or sterilized because the crimes are generally sanctioned by a ruling government.
- The sheer number of victims effectively precludes the hiding or cleaning of all forensic evidence; the mechanisms and modes are easily determined.

Death Scene Management, Tasks, and Responsibilities

V

The processing of a death scene requires certain roles to be filled and tasks to be accomplished no matter the size and complexity of the scene and the response. The management of these tasks and the overall approach to the death scene fall to the lead death scene investigator (DSI). The tasks and roles are described below. It is important to note, whether a death scene is processed by one DSI or a team, every task and role must be handled.

Arrival and Initial Organization

The lead DSI should refer to Chapter 1 (Initial Response) for guidance. He or she:

- Exercises overall control of the death scene
- Ensures appropriate legal authority exists to examine the scene
- Establishes entry control point and designates access routes into and through death scene
- Is responsible for initial walk-through and formulation of death scene strategy
- Makes assignments to other DSIs if required to accomplish death scene observations, photography, sketching, searching, and evidence collection and processing
- Ensures required equipment and support are available
- Ensures safety and comfort (as far as possible) of DSIs

Strategy and Direction

The lead DSI should refer to Chapter 2 (Scene Evaluation and Strategy) for guidance. He or she:

- Determines whether the death is suspicious. Refer to Figure 2.1 (death investigation decision tree).
- Determines the preliminary manner of death to set the direction of investigations.

Available Personnel

Certain tasks are routine parts of investigation of a death scene. A team approach may be warranted when a coordinated and trained death investigation team responds. In many cases, one or two DSIs will be the only available assets and will be responsible for the following tasks:

- Scene observation. Refer to Chapter 32 (Death Scene Notes and Observations).
- Photography and videography. Refer to Chapter 31 (Death Scene Photography and Videography).
- Sketching. Refer to Chapter 30 (Death Scene Sketching).
- Searching. Refer to Chapter 9 (Searching for Human Remains) and Chapter 33 (Death Scene Search Procedures).
- Collection and recovery of evidence. Refer to Chapter 2 (Scene Evaluation and Strategy) and Section VI (Death Scene Evidence Processing).
- Death scene interviews. See Chapters 3 through 6 and individual chapters dedicated to specific scenes or injuries.

Scene Documentation and Processing

The lead DSI should refer to Section V for guidance. He or she:

- Ensures thorough documentation of scene through notes, photography and sketches (Chapters 30 through 32)
- Ensures all processing of the scene is appropriately documented
- Ensures all items of evidence are properly preserved, collected and entered into the evidence custody system (Section VI)

Command Function

The lead DSI:

- Briefs organizational command structure as appropriate
- Establishes command post if necessary
- Establishes media control point if necessary

Scene Completion and Post-Scene Activities

- Determine appropriate time to release the scene and ensure the scene is secured and turned over to appropriate responsible party.
- Attend or designate DSI to attend the autopsy.
- Determine whether the scene should be held until the autopsy results are available (recommended for any suspicious death).
- Ensure all evidence is screened for forensic value and sent to the appropriate laboratory for analysis.
- Ensure all death scene reports are completed.

Death Scene Sketching 30

The death scene sketches document spatial relationships among the body, evidence items, and the scene. A series of sketches may be required to document a death scene. An overall sketch showing the location where the body was discovered, an area sketch showing the relationship of the room or area to the structure floor plan, and a sketch showing the body in relationship to its immediate surroundings are examples of rough and finished sketches typical of a death scene.

Rough sketch — The original sketch drafted at the scene. It may be drawn on graph paper with a pencil, usually with a straight edge and other simple drawing tools or a template ([Figure 30.1](#)).

Finished sketch — Based on the rough sketch. The finished sketch may be drawn using templates and straight edges or by simple computer software or advanced CAD programs ([Figure 30.2](#)). Sketches may also be prepared from laser and photographic mapping systems.

Sketch Components

- An arrow indicating north is placed on a sketch to show scene orientation. In certain cases (a ship or boat on water, an airplane in flight) a north arrow would serve no purpose. Sketches of such craft should be oriented to a logical feature such as the bow of a ship or the flight deck or nose of an aircraft.
- The sketch should be marked “not to scale.”
- A title block should show the case title, location, dates, and name of sketch preparer.

Depictions

- An area sketch depicts the general area of the death scene and shows surrounding homes and properties, street names, and other pertinent features.
- A scene sketch includes all areas where evidence is located.

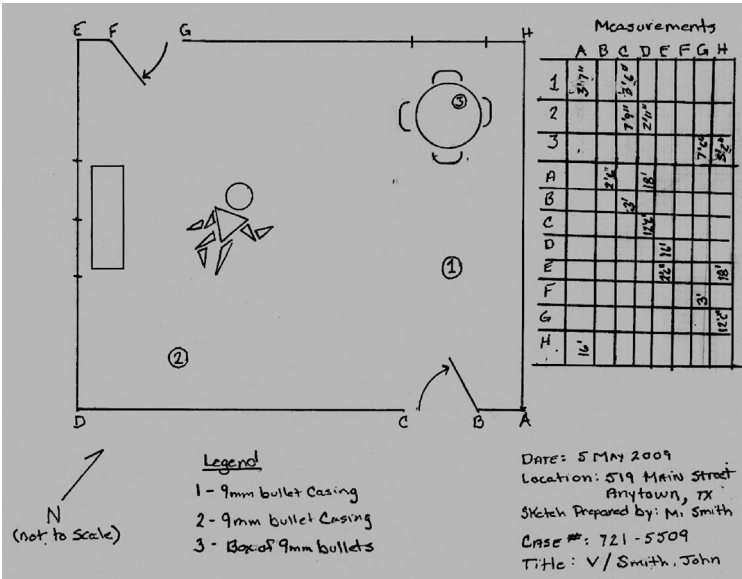


Figure 30.1 Rough sketch of a death scene.

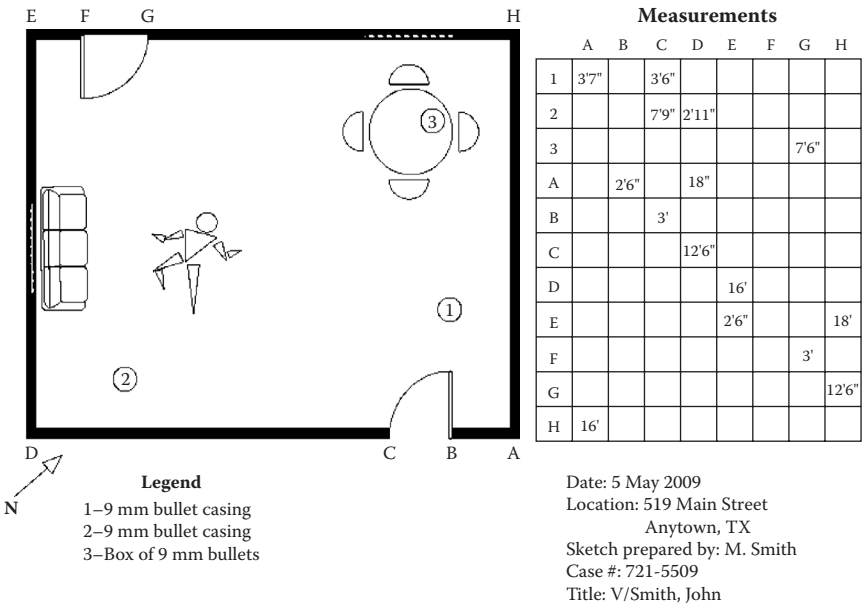


Figure 30.2 Finished sketch of a death scene.

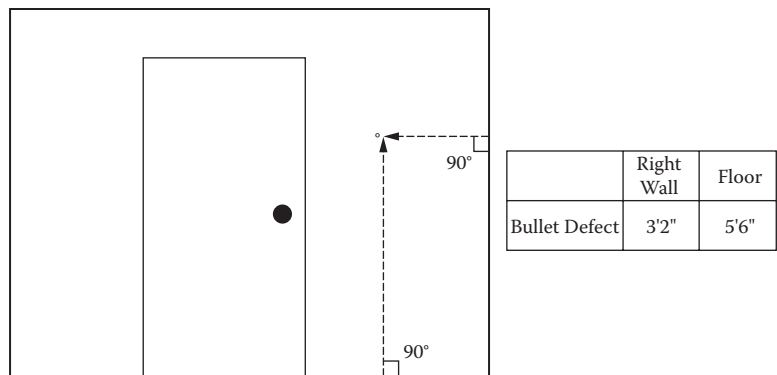


Figure 30.3 Bullet defect on wall.

- A detailed sketch shows the spatial relationship of the body and the immediate surroundings or landscape in which the body is found or the death occurred.
- Additional sketches may be prepared to show evidentiary findings such as bloodstain patterns or bullet defects and trajectories (Figure 30.3).

Sketch Types

- Bird’s eye (Figure 30.4)
- Exploded (Figure 30.5)
- Elevation

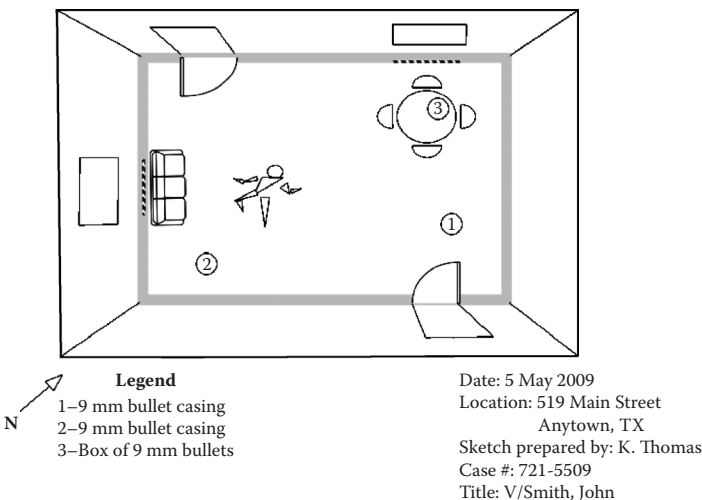


Figure 30.4 Bird’s eye view.

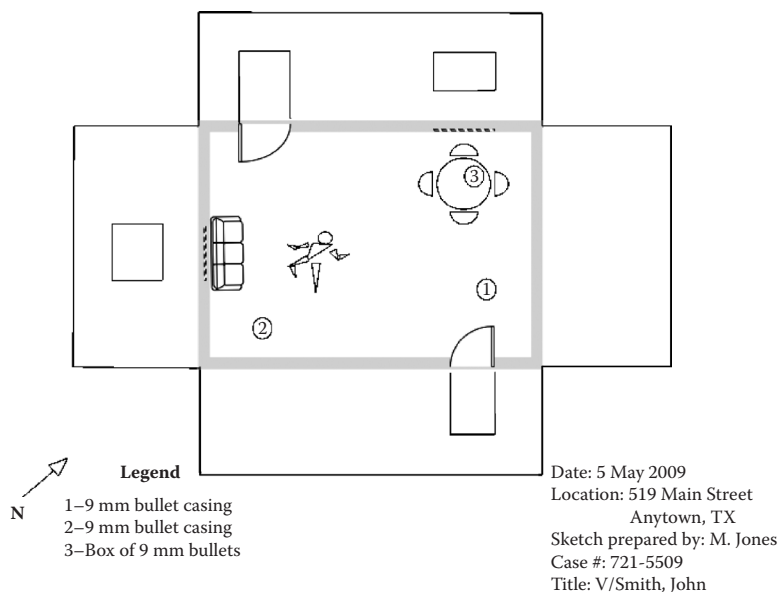


Figure 30.5 Exploded view.

Scene Measurements

- The scene where the death occurred must be measured in preparation for sketching. A standard tape or electronic tape measure meant for crime scene purposes may be used.
- General death scene measurements of room dimensions may be taken to the nearest $\frac{1}{4}$ inch.
- Evidence measurements may generally be made to the nearest $\frac{1}{4}$ inch. If a greater degree of precision is required to document a specific spatial relationship, a smaller unit of measure may be used.
- In documenting bloodstain patterns and bullet defects, the most precise measurement unit available should be photographically depicted. These measurements are generally represented using a metric scale with millimeter demarcations (Figure 30.6).
- Measurements of evidence may be taken to its center mass if spatial orientation does not matter. An example would be measuring to the center of a strand of hair on a carpet or an ejected bullet casing (Figure 30.7).
- At least two separate sets of measurements to two different points on the evidence may be taken if spatial orientation is important. An example is measuring to both the handle and tip of a knife blade or to the front sight, rear sight, and tip of the trigger on a handgun.

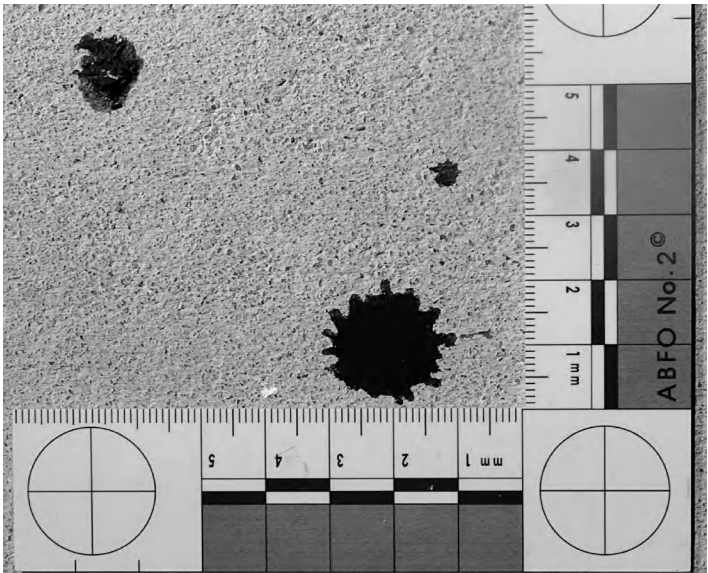


Figure 30.6 Documenting individual blood stain patterns or bullet defects.

- When placing a body on a sketch, measurements should be made to the umbilicus (navel), nose, wrists, elbows, ankles and knees (Figure 30.8).
- Stick figures of bodies are not appropriate. Draw a simplified body using a circle and triangles as depicted in Figure 30.9.

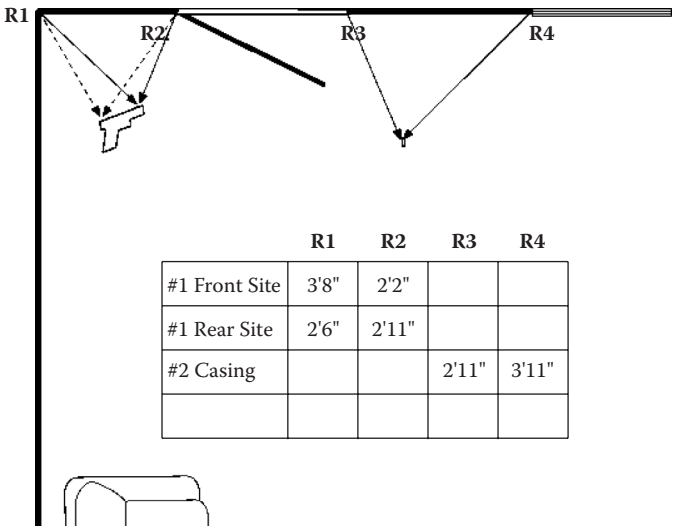


Figure 30.7 Measuring items of evidence.

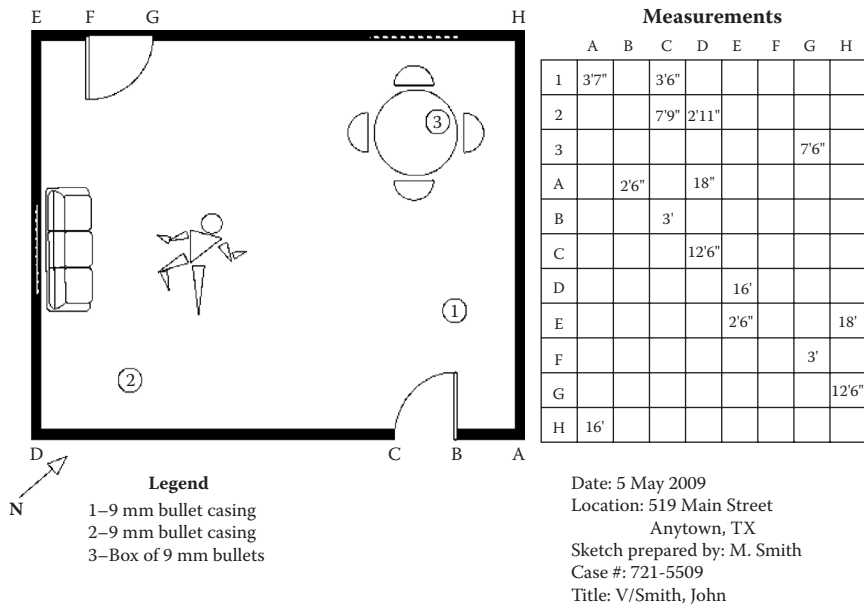


Figure 30.10 Using a table to represent measurements.

- Reference points for measurements are designated by upper case “R” followed by numbers (R1, R2, R3).
- If only a few evidence items are involved, the measurements may be depicted with straight lines and the measurement noted beside them.
- A sketch containing many measurements very quickly becomes confusing and difficult to decipher. A table (on the sketch or on a supplemental page) indicating the distances between fixed points, fixed points and furnishings, and fixed points and items of evidence can help clarify a sketch (Figure 30.10).

Methods of Measuring

Triangulation — Depicts furnishing and items of evidence on horizontal surfaces. Measurements are taken from two fixed points to the item of evidence. The distance between the two fixed points must be known (Figure 30.11).

Rectangular coordinates — Fixes items of evidence on a horizontal a vertical surface such as a wall. This method is used for documenting locations of bloodstain patterns and bullet defects. Measurements are taken at 90 degrees to the floor and the nearest intersecting wall or feature such as a door frame (Figure 30.12).

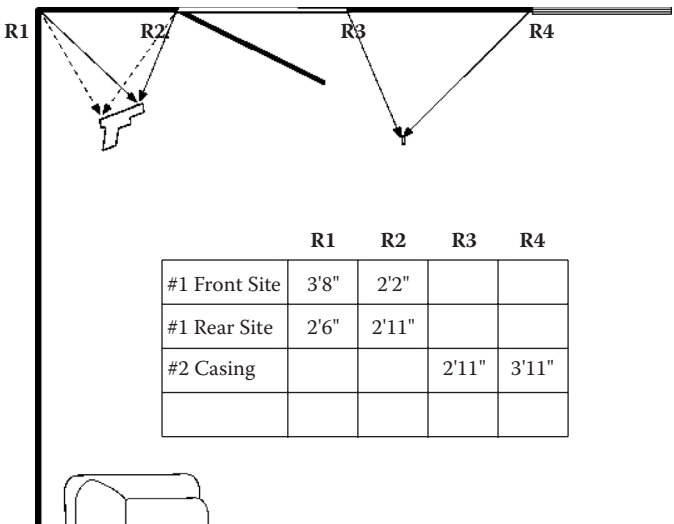


Figure 30.11 Triangulating items of evidence.

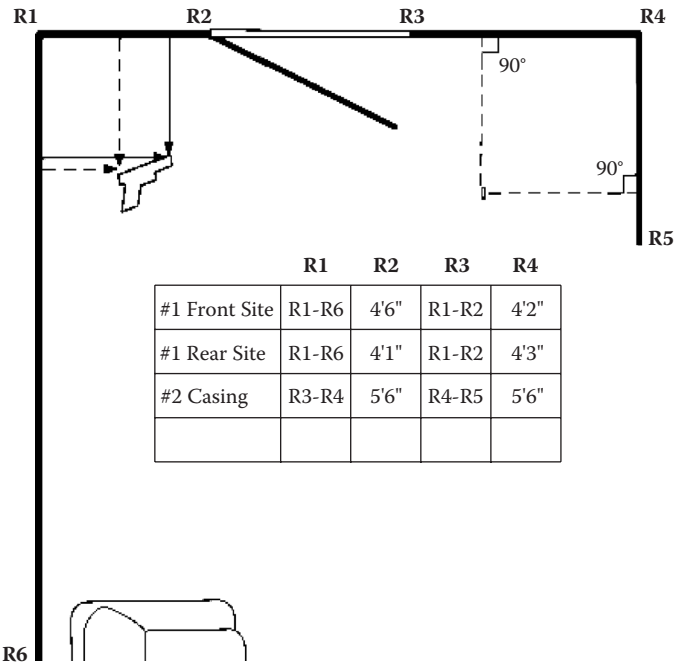


Figure 30.12 Rectangular coordinates method of measuring evidence.

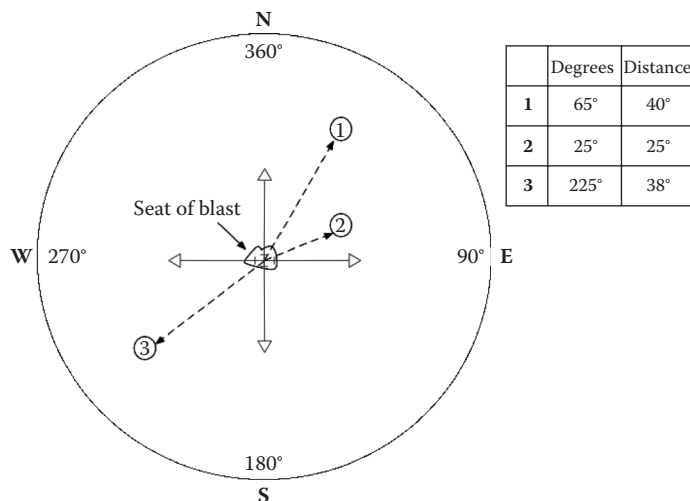


Figure 30.13 Measurement by polar coordinates.

Baseline — Often used indoors when an item of evidence touches a fixed architectural line, for example, a spent bullet casing located 6 feet, 2 inches from the south corner along a wall running south to north.

Baseline method for outdoor scene — This is a modification of rectangular coordinates measurement. A long tape measure is run between two fixed points (telephone poles, trees, or other landmarks) after fixing the two points using a global positioning satellite (GPS) system. Measurements are then taken at 90 degrees from the baseline and represented as plus (+) or minus (-), depending on which side of the tape the measurement was made. A GPS point may be fixed further if appropriate by driving a short piece of rebar into the ground. This will allow for later location of the fixed points throughout the search area using a metal detector.

Polar coordinates — A fixed point is established and a compass heading (azimuth) is noted. The distance along the azimuth to the evidence is measured. An azimuth is most accurately measured with a surveyor's transit or a lensatic compass. As an example, an item of evidence would be described as lying 225 degrees, and 38 feet from a base point (Figure 30.13).

Evidence Identification

- Evidence items removed from a scene are usually numbered sequentially (1, 2, 3).
- Pattern evidence items such as two-dimensional footwear impressions, bloodstain patterns, or evidence that cannot be moved (bullet defect in asphalt or concrete) are designated by upper case letters (A, B, C). If a pattern is collected or sampled as physical evidence it is co-designated with a number on an evidence custody form.
- A legend (on a sketch or supplemental page) should be prepared to identify each number and letter with a description of the item of evidence it represents.

Photography

Set-Up

- Begin and maintain a photo log. If available, have a photographer's assistant maintain the log. Appendix B7 is a photographic log.
- The detail required for a photographic log will be based on your camera and capture method. At a minimum, exposure number and description of the view are required.
- When using digital photography with metadata, the ISO, f-stop, aperture setting, and flash do not have to be noted on the log if they are recorded as metadata.
- Any external flash, lighting, or filters not recorded as metadata must be cited in the photographic log.
- If date and time are stamped on exposures or recorded in metadata, ensure they are correct.
- If using digital media, ensure that the card or memory stick is new or has been reformatted. Do not start taking photographs on a partially filled data source.
- If using film, do not start on a partially exposed roll. Use a fresh roll.

Technique

- The first photograph should depict the head slate (card identifying photographer, date, case title or number, and organization).
- Use the highest resolution image available on your camera.
- Raw images allow the highest resolution as well as digital evidence that they have not been compressed or altered.
- Raw images should be transferred to an evidence quality CDs as soon as possible and prior to viewing or image enhancement.
- Working copies may be made from raw images and stored as .jpeg or other portable files. These copies may be enhanced digitally as necessary.
- When working with a program that allows digital enhancement and correction, ensure that each step of alteration to the original is recorded.
- If working with film instead of digital media, it may be necessary to "bracket" your exposures. In other words, expose the same photograph at +/- 1 f-stop to ensure proper exposure.



Figure 31.1 Evidence photographed without scale.

General Guidelines

Never include scene processing equipment and investigators in photographs. The evidence should be photographed first without scale and then with scale (Figure 31.1).

When slower shutter speeds are used, consider using a tripod to ensure sharpness. In examination quality photographs, fill the frame with the evidence and take the photograph 90 degrees from the area of the evidence of most interest (Figure 31.2).



Figure 31.2 Examination quality photograph.

Ensure that the film is appropriate for the lighting. The tungsten surgical lights in autopsy rooms generally do not render true color if daylight film is used. A tungsten type film is recommended.

Ensure that the white balance is correct for the lighting with digital exposures. This may involve setting the camera for automatic white balance or choosing appropriate lighting.

Flash Use

Flash should be used on most indoor and many outdoor exposures. The flash will correct for white balance and fill in the shadows.

Shadows often accentuate detail and highlight impressions. Use a detachable electronic flash unit to manipulate or eliminate shadows.

Front lighting eliminates unwanted shadows and highlights evidentiary details. In some situations, too much light will wash out detail or eliminate accentuating shadows.

Off-camera flash capability is critical for death scene photography to allow oblique lighting and fill flash.

A flash may be angled across the surface to be photographed to provide low-level oblique lighting that enhances surface texture. This is an important technique for photographing footwear impressions, tool marks, bite marks, and trace evidence.

An off-camera flash may be aimed to fill in shadows naturally created at a scene (Figure 31.3).

An off-camera flash may also be used to “paint” the background into photographs of luminal or luminal type reactions.

Off-camera flash photography is also used to illuminate large areas in the dark; the technique is called “painting with light.”

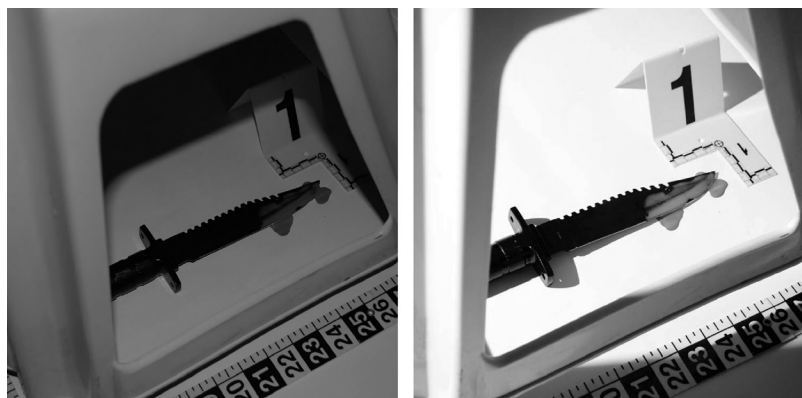


Figure 31.3 Using off camera flash to fill in shadowed areas (fill flash).

Filter Use

- A polarizing filter allows photography of objects through windows or in shallow water.
- A neutral density (ND) 30 filter or series of ND filters may be useful in photographing green laser in daylight conditions.
- A variety of colored filters may be useful to photograph friction ridge detail on colored surfaces. When photographing in black and white, color filters may be used to “drop out” the background color and make fingerprints more visible.
- For fingerprint photography on multicolored or bright surfaces, color filters closely matching the background will cause the background to drop out, making prints more visible.

Scene Photography

- Photograph areas around a scene, including possible points of entry and exit.
- Include exterior shots if a scene is inside a structure.
- Consider aerial photography to show spatial relationship in a scene. An aircraft, aerial ladder, or elevated vantage point may be used.
- If strong, natural back lighting conditions exist, use a flash aimed in a direction that will eliminate shadows or photograph from a different angle.
- Avoid taking a photograph that includes you or your equipment as a reflection from any surface. Also avoid taking a photograph where your shadow is visible.

Overlapping Method

- Take a series of photos in a circular, clockwise direction to cover 360 degrees around a point.
- Overlap each photo with items or areas from the preceding photo to permit matching or comparison.
- Include floors and ceilings in your photographs.

Progressive Method

- Pinpoint a specific item in a scene and show its relationship to other items in the scene.
- Take a series of overall, mid-range, and close-up photographs (with and without scale) from the same angle and line.
- Micro or macro photographs may be needed to show detail on close-ups.

Photographing Evidence

- Photograph all evidence before moving it.
- Photograph every item where found. Place every item in context with its surroundings by taking evidence-establishing shots and close-up shots.
- Repeat the evidence-establishing and close-up shots after placing an evidence placard and scale (if not part of the placard) by the item.



Figure 31.4 Overall photograph.

Take an examination quality photograph if required.

Coordinate with the sketcher, on-scene evidence custodian, and evidence collection team before moving an item.

Photographic Perspectives

Overall — Establishes the relationship of a scene to its surroundings (Figure 31.4).

Evidence-establishing (mid-range) — Establishes relationships between items of evidence and scene (Figure 31.5).



Figure 31.5 Evidence establishing (mid-range) photograph.



Figure 31.6 Close-up photograph.

Close-up — Shows the item of evidence in detail (fill the frame with the item); should be taken with and without scale (Figure 31.6).

Examination quality — Used to document friction ridge evidence (latent prints) when first observed and after processing (prior to lifting); also used to document impression evidence, toolmarks, and bite marks prior to casting (Figure 31.7).

Work closely with the sketcher; photographs and sketches must augment each other to depict a death scene accurately.



Figure 31.7 Examination quality photograph.

Videography

Set-Up

If a date and time stamp is used, ensure the date and time are correct.

Synchronize all team members' watches with video recorder time stamps.

While this may seem unnecessary, consider a critical item of evidence that does not appear in a crime scene photo or video 5 minutes before it is recorded as having been collected.

When possible disable the recording of audio.

Record the image of a head slate (identifier card showing photographer name, date, case title or number, and organization). See Appendix C (photographic head slate).

Technique

Remember to pause at least 3 seconds before changing camera direction, angle, or zooming.

Remove all personnel and DSI equipment from the area to be recorded.

Personnel and equipment should not appear in the video.

Do not walk or move while the camera is recording.

Videography Subjects

The scene during initial walk-through or shortly thereafter

General location of incident

Bystanders or onlookers near scene

General and specific conditions at scene

Items of evidence and their spatial relationships to the scene and other evidence

The body and its condition before it is turned or moved. Continue video recording when the body is turned for processing.

Consider recording the scene again before leaving it.

Scene Observation

The scene observer records all objective data at the death scene. Each DSI is still responsible for his or her own notes and should document the overall scene and his or her observations.

- Written notes are best for recording observations.
- Audio recording may be appropriate when time does not allow note taking, for example, in a hostile area, where danger is imminent, or where bloodborne or other pathogen contamination may occur.

Indoor Scene Observations

- Structure
- Type of structure (apartment, house, townhouse, commercial building)
- Number of stories (single-story, two story, etc.)
- Construction (brick, wood, masonry, other)
- General appearance
- Evidence of criminal activity
- Signs of forced entry
- Evidence of struggle
- Evidence of ransacking
- Is there video coverage of avenues of approach to the area?
- Is there video coverage of the scene (security system, nanny cam)?
- Are items missing?

Doors

- Are doors open or closed?
- Are doors locked or unlocked?
- What types of locks are on doors?
- Are the doors bolted from inside?
- Is there evidence of forced entry?
- Who has keys or a passkey? Are all keys accounted for?

Windows

- Are the windows open or closed?
- Are the windows locked or unlocked?
- What types of locks are on the windows?
- Are there screens on the windows? Are the screens in place?
- Is there evidence of forced entry?
- What window treatments (curtains, blinds, shades) are in place? What are their positions?

Kitchen and Dining Room

- Is food preparation indicated?
- Does food preparation indicate a second person present?
- Food storage conditions; note dated foodstuffs in pantry and refrigerator.

Environmental Controls

- Room temperature
- Thermostat setting
- Is thermostat on timer? What are the settings?

Laundry and Utility Areas

- Are appliances including washer and dryer running or warm?

Lighting

- Are the lights on or off?
- Do the lights work?

Telephones and Mobile Phones

- Is there a record of incoming and outgoing calls? Investigate such calls.
- Are messages on an answering machine?
- Is there an off-site answering service? How are messages obtained?
- Can mapping of cellular towers indicate where a call was made?
- Are there text messages? Ensure charger is included with a seized mobile phone.

Mail

- Are dates on outgoing mail?
- Are there any time-dated receipts?
- What are the dates on mail in the box?
- What are the dates on mail delivered or opened?

Wastebaskets and Ashtrays

- Check and document the contents of wastebaskets and trash containers.
- Check ashtrays. If a second person may have been present, consider collecting cigarette butts for DNA analysis.

Bath and Toilet Areas

- Are damp or bloodstained towels or washcloths present?
- Is there evidence of recent bathing or washing (wet tub and towels)?
- If victim is a single female living alone, is the toilet seat raised?
- Is there evidence that a suspect may have washed up?
- What drugs or medicines are in cabinets?
- What are the dates on prescription medications? How many tablets or capsules are missing?

Calendars and Planners

- What are the entries on calendars for the period before and contemporaneous to the death?
- What are the diary or day planner entries for the period before and contemporaneous to the death?

Computers and Internet

- When did the victim last use the computer?
- Was the computer used after the victim's suspected time of death?
- Is there email, chat, or telephone activity contemporaneous to the time of death?

Body***Clothing***

- Is clothing worn appropriate for time of day and location?
- Does the clothing contain laundry marks or identification?
- Is the clothing unusually soiled or worn?

Postmortem Indicators

Chapter 13 covers estimation of postmortem interval.

- What is the state of livor mortis? Is it fixed or fluid?
- What is the state of rigor mortis? Is it absent, partial, or full?
- What is the state of algor mortis? Is the body warm or cool?
- What is the state of decomposition? Can discoloration, bloating, marbling, or skin slippage be seen?

Identification of Decedent

- Are there documents or indicators that identify the deceased?
- Are there tattoos, scars, or marks that may help identify the deceased?

Wounds and Injuries

- Does the victim have apparent injuries or wounds?
- Do any injuries appear defensive in nature?
- Are there injuries that appear to be hesitation marks?
- Are there indications of the type of weapon used?
- Do bloodstain patterns on the body indicate position or movement?

Outdoor Scene Observations***Environmental Conditions***

- Temperature
- Humidity
- Temperatures and humidity levels since death

Immediate Area of Death Scene

- Is there evidence of a struggle?
- Are footwear impressions or tire marks present?
- Is there video coverage of the area?
- Was evidence discarded in nearby trash receptacles?

Extended Area of Death Scene

- What are the likely paths of travel to and from the scene?
- Was evidence discarded in trash receptacles, ditches, underpasses, or other places?
- Is there video coverage of avenues of approach to the area?
- Can nearby convenience stores or gas stations provide video coverage?

Some evidence such as an abandoned knife or gun may be readily apparent. Other evidence is not detected so easily. One or more detailed searches for evidence should be made during scene processing.

General Search Guidelines

- The most time-consuming search is generally the most thorough.
- All items that may have evidentiary value should be noted.
- Items that you would expect to see, but are not present, should also be noted.
- The search steps and pattern chosen must be methodical.
- The space to be searched may be a confined area such as an office, room, or vehicle, or an unconfined outdoor field, wooded area, or body of water.
- The most logical search method should be adapted to the unique aspects of the search area.

Confined Area Searches

Confined area searches are conducted within obvious boundaries, for example, in a car, office, room, or house.

Point-to-Point Search

- This technique is a direct movement to an item of perishable evidence, usually a body, searching and clearing a path along the way.
- The cleared path should avoid the perpetrator's suspected path of travel ([Figure 33.1](#)).

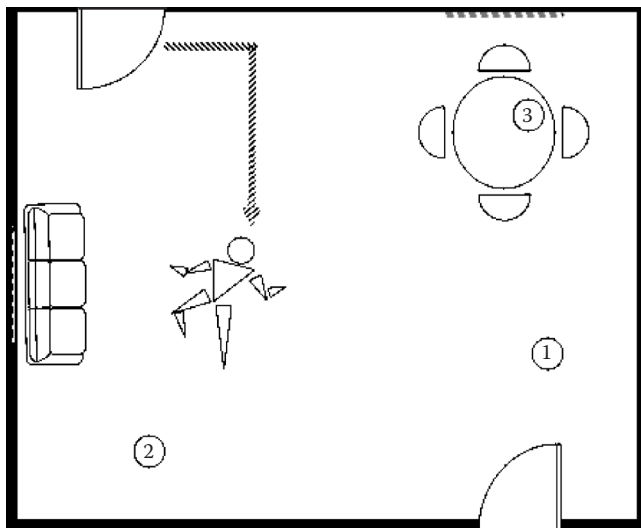


Figure 33.1 Point-to-point search.

Clockwise and Counterclockwise Search

- Two DSIs start at a common point such as a door or entryway.
- One searches clockwise, the other counterclockwise.
- When they meet, they continue past each other. Each DSI again covers the area searched by the other.
- This method is effective in confined spaces ([Figure 33.2](#)).

High and Low Search

- Two DSIs start at a common point such as a door or entryway.
- One searches only mid-room and downward, the other mid-room and upward.
- When they get back to the beginning point, they switch search levels so that each DSI re-searches the area searched by the other ([Figure 33.3](#)).

Sector or Zone Search

- This method is effective for confined spaces such as an office, room or vehicle ([Figure 33.4](#)).
- An imaginary line can be used to divide a room into quadrants (sectors or zones).
- Logical sectors for a motor vehicle search are front passenger compartment, rear passenger compartment, trunk, and engine compartment.

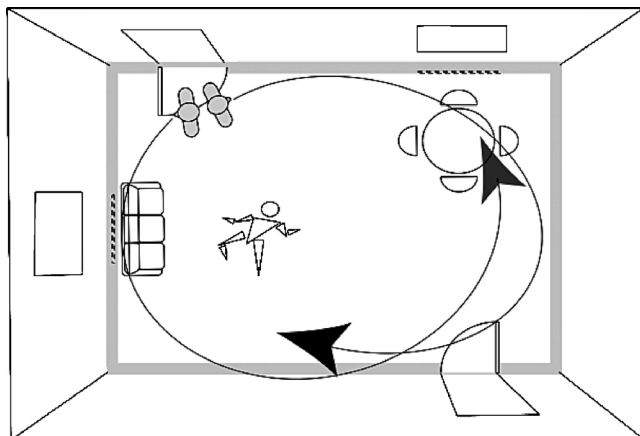


Figure 33.2 Clockwise and counterclockwise search.

Open Area Search

An open area search differs from a confined area search because no obvious boundaries contain the area of evidence. Examples are open fields, wooded areas, yards, and other spaces without clear boundaries. These techniques are also suitable for large areas with ambiguous boundaries, for example, warehouses.

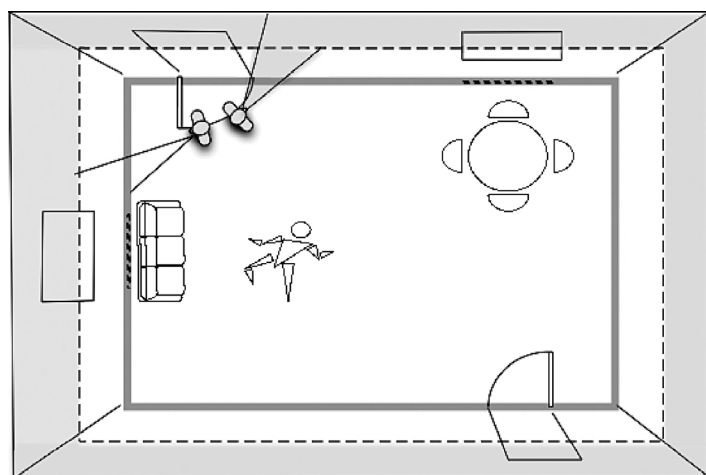


Figure 33.3 High and low search.

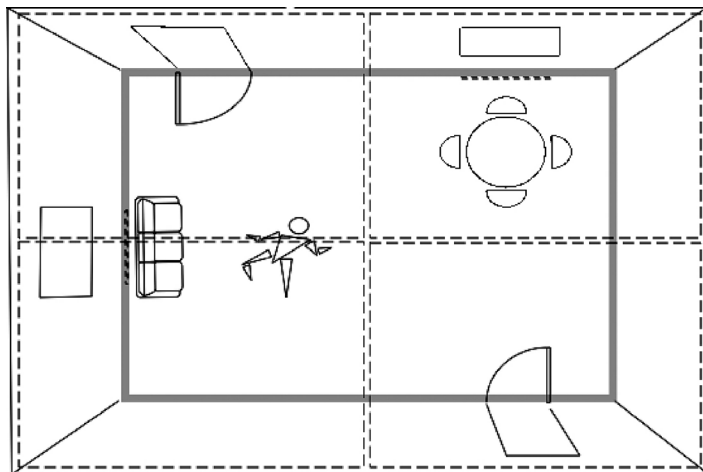


Figure 33.4 Sector or zone search.

Line Search

- Line searches are effective for large areas and outdoor sites (Figure 33.5).
- A group of investigators form a line and stand slightly closer than arm's width apart. They methodically move through the search area in a straight line.
- It may be necessary to repeat a search on hands and knees.
- A third search may be necessary. The searchers clear in front of them to bare earth as they move forward.

Grid Search

- A grid search is a line search that doubles back over itself at right angles to the first search. It is very effective for searching large spaces and outdoor areas.
- A grid search may be repeated with increased scrutiny on each pass (Figure 33.6).

Spiral Search

- The search pattern spirals outward from a central area of interest.
- This pattern has limited value because it is easy to overlook evidence.
- It may be effective for underwater searches or when moving from an area of known evidence into an unconfined space (Figure 33.7).



Figure 33.5 Line search.

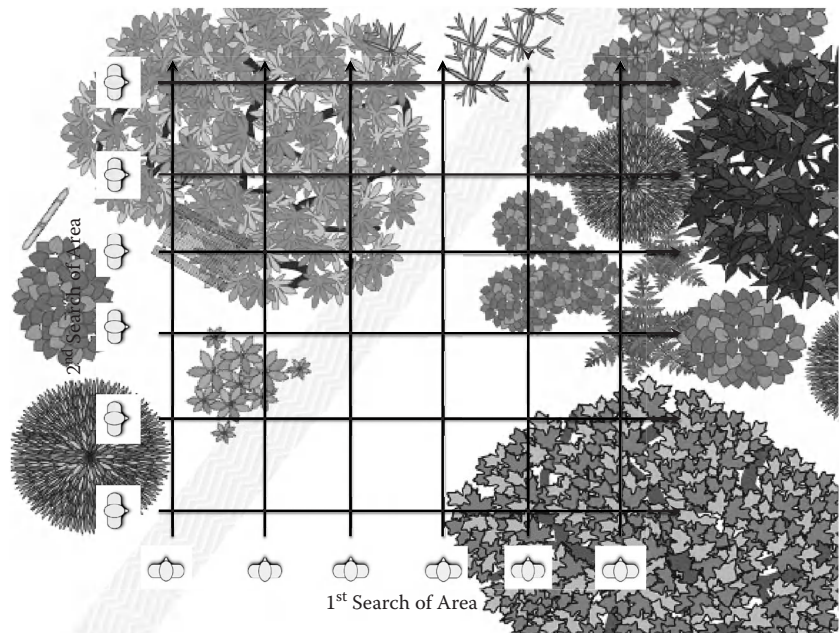


Figure 33.6 Grid search.

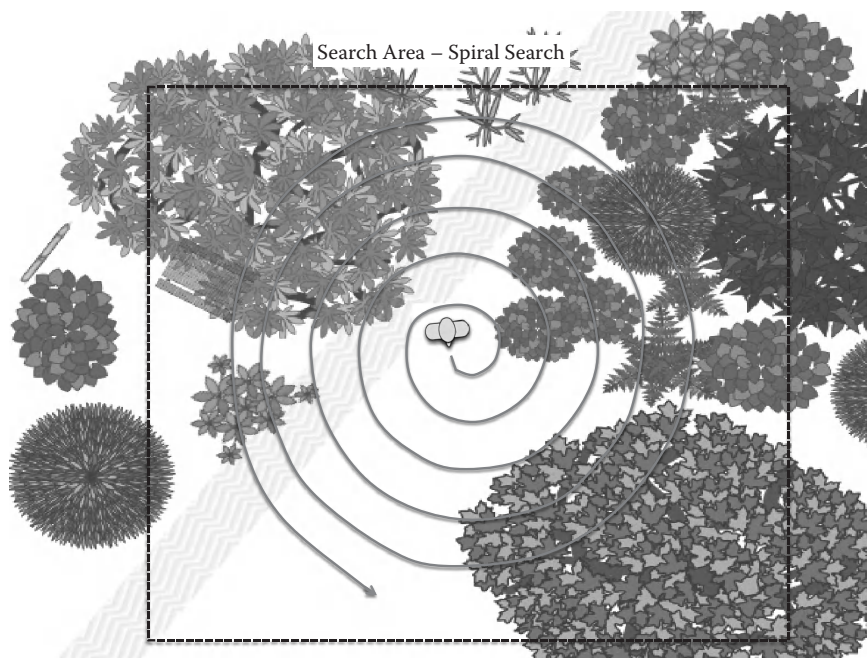


Figure 33.7 Spiral search

Specific Search Guidelines

- Likely points of entry into a structure should be examined for latent prints, tool marks, impressions, and trace evidence.
- Likely paths of travel of the perpetrator should be examined for foot-wear impression and trace evidence.
- Items identified as having been handled or touched by the perpetrator should be examined for latent prints.
- Areas where struggle or contact between the suspect and victim took place should be examined for trace and biological evidence and foot-wear impressions.
- Areas where the perpetrator may have washed up should be examined for latent print, impression, biological, and trace evidence.
- The likely point of exit from the scene should also be processed for latent print, impression, biological, and trace evidence.

Body Search

- Section I covers manners of death and aspects of examining a body.

Vehicle Search

Exterior

- The exterior of a vehicle should be examined first
- Pay particular attention to the grill area and hood.
- Look for broken or damaged areas, imprints in dust or road grime on the finish, hairs and fibers, missing parts, and other irregularities such as patterns from clothing.
- Examine the exterior for fingerprints around the top of the car, around the door handles, and the window glass. Collect latent prints immediately to avoid destruction.
- Examine the undercarriage for fibers, hair, blood, and human tissue.
- If relevant, collect samples of dirt, grease, and road grime from the underside of the vehicle. Look for soil in wheel wells and running boards.
- Take paint samples around the damaged area from the surface to bare metal.

Interior

- Divide the interior of the automobile into specific zones and record the search results and collection of evidence in each zone.
- Consider the relevance of fibers and dirt from the floors of the passenger areas.
- Search for hidden drugs and weapons.
- Have two investigators search the same areas to reduce the chances of overlooking evidence.
- Do not reach into places you cannot see; use mirrors and lights to search inaccessible places.

Trunk

- Follow the same procedures used to search the interior.

Engine Compartment

- The engine compartment generally contains little physical evidence.
- Concentrate on concealed tools, weapons, and drugs. Search the area inside the grill, the area around the radiator, and containers attached to the fenders.

Computer Search

- A computer or electronic information system may contain valuable information related to a death, for example, notes or sites visited that may suggest an illness, fascination with suicide, a suicide note, or evidence of criminal activity that may have played a role in the death.
- Computer use involving the Internet, chats, phone calls, and e-mails may indicate activities that occurred contemporaneously with death.

Seizure

- Only stand-alone systems should be seized. Networked systems *must* be seized by a forensic computer specialist.
- Immediately photograph the monitor if it is on.
- Do not shut down the machine through standard system shut down procedures.
- Do not touch keys.
- Immediately isolate the system from outside connectivity.
- Disconnect from network provider by removing connection from wall outlet.
- Disconnect a wireless LAN hub connection by unplugging the power to the hub from the wall outlet.
- Unplug the computer power cord from the wall outlet or surge protector.
- If the computer is connected to a battery back-up system, disconnect the computer from the source.
- Photograph all connections from the ports.
- Photograph all peripheral devices.
- Seize the CPU and all devices for storing digital media.

Analysis

- On-scene evaluations should be performed only by trained forensic computer specialists or contracted experts.
- If you try to retrieve or review the contents of a computer system at a death scene, you may unintentionally destroy evidence or render it inadmissible in court.
- Consult a forensic computer specialist if it is necessary to evaluate the contents of a computer system at the scene.

**Death Scene
Evidence
Processing**

VI

Documenting and Processing Bloodstain Patterns

34

Blood spatter, flows, transfers, and drips arising from crimes of violence and violent incidents and injuries often leave patterns that may be interpreted to help reconstruct the events. These patterns should be interpreted only by a properly trained bloodstain pattern analyst. Bloodstain pattern analysis is best performed at the scene by an expert; however a properly documented and processed scene allows for analysis later. The basic steps are:

- Detect all bloodstain patterns on the body and at the scene.
- Isolate the patterns, particularly where they overlap.
- Identify the patterns as far as possible.
- Document the patterns through a mapping technique for bloodstain pattern analysis.
- Identify a discrete spatter or portion of the pattern to be sampled for DNA analysis.
- Document and collect that sample.

Detection

- Bloodstain patterns may be visible on the walls, ceilings, and floors, and on intermediary objects associated with a violent incident.
- Identification and documentation of these patterns is essential for proper analysis.
- Although many bloodstain patterns are obvious at the scene, subtle transfer patterns and very fine misting patterns may be easily overlooked.
- The scene must be thoroughly searched for bloodstain patterns.

Visual Method

- Direct strong white light at 90 degrees to the surface.
- Direct strong white light at an oblique angle to the surface.
- Use magnification when examining surfaces.



Bloodstain on dark jacket using ALS.

Figure 34.1 Bloodstain pattern viewed under alternate light source (ALS).

Alternate Light Source (ALS) Method

- Ultraviolet (UV) light (350 nm) will not fluoresce blood. Blood may contrast with its background and appear as a dark hole on a surface.
- Blood does not fluoresce when exposed to alternate wavelengths of light. However, when exposed to 415 nm of light and viewed through yellow goggles, a bloodstain will absorb the light. The appearance of the stain will be like a dark hole in the background material (Figure 34.1).

Infrared (IR) Method

- Infrared videography and photography of dark colored items are excellent techniques for revealing bloodstain patterns (Figure 34.2).
- Specialized IR cameras are available for forensic work; they are easy to use and yield excellent results.
- IR filters may be used on digital cameras. Less expensive cameras have built-in IR filters that may not capture bloodstain patterns.
- IR filters on digital cameras require care in focusing. The IR focal point is different from that for visible light. This may cause difficulty with auto-focus.

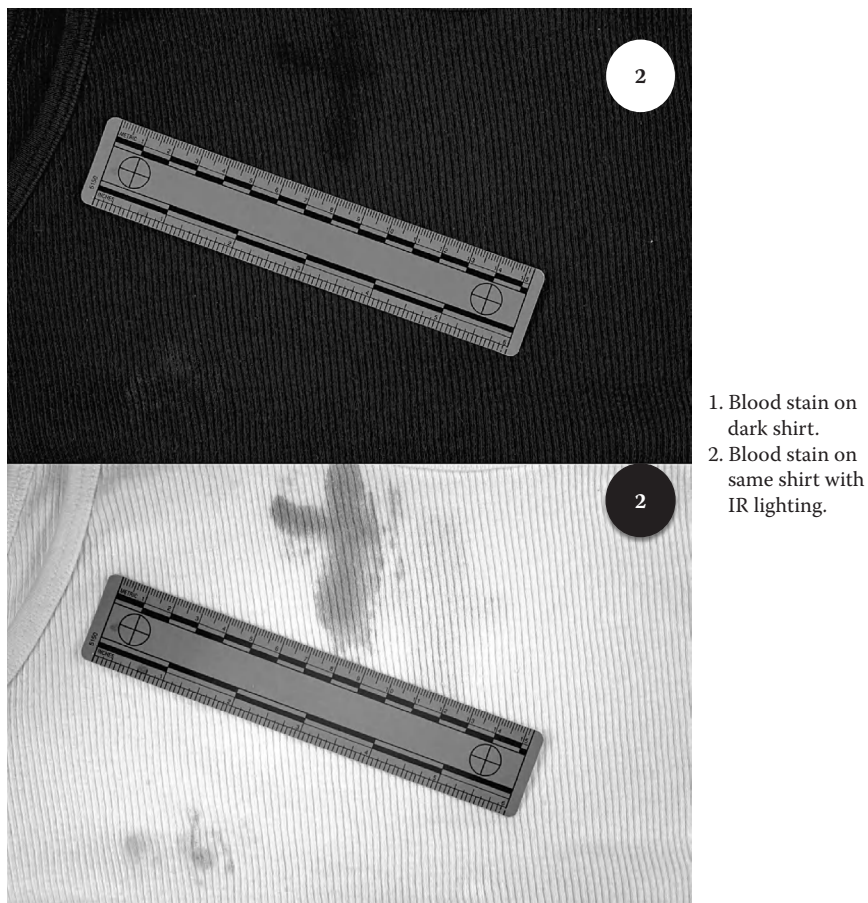


Figure 34.2 Bloodstain pattern revealed by infrared (IR) photography.

Chemical Enhancement Method

- In cases where a death scene is reconstructed after the scene has been cleaned, the use of chemical enhancement to the blood to expose patterns may prove beneficial.

Luminol

- This chemical causes minute amounts of blood to fluoresce.
- It does not adversely affect DNA analysis.
- It works on surfaces cleaned of blood and in some cases it reveals painted-over blood.
- It should not be used on visible bloodstains. It may be used to extend the margins of visible bloodstains if clean-up is suspected.

- Luminol must be used and photographed in total darkness. Any ambient light greatly reduces its ability to reveal and photograph fluorescence.
- Photograph with time exposure, set the background with a fill flash near the end of the exposure.

BlueStar®

- This is a luminal-based product that does not adversely affect DNA analysis.
- It is very sensitive to extreme dilutions of blood.
- It does not require total darkness. Ambient lighting should be reduced as much as possible to near darkness.
- BlueStar should be applied according to manufacturer instructions.
- It is best applied with a commercially available atomizer or compressed paint gun that has no metal parts that would be exposed to the spray.

Fluorescein

- Fluorescein is not commercially available; it requires a two-part laboratory preparation.
- The reaction lasts longer than the luminal reaction.
- Repeat application with fluorescein is more effective than application of luminol.
- The reaction appears and should be photographed with an ALS set to 450 nm and viewed through yellow goggles.
- Use an ALS at 445 nm and orange or yellow barrier filters (goggles).

Isolation and Identification of Discrete Patterns

The bloodstain pattern taxonomy approach to classifying bloodstain patterns was introduced by Bevel and Gardner in their *Bloodstain Pattern Analysis* text. Analysis allows a decision-based approach to identifying discrete bloodstain patterns. Bloodstain patterns should be classified only by trained experts. If that is not possible, it is sufficient to isolate the patterns based on their general appearance and document them via a mapping technique.

Spatter

Linear Spatter (Figure 34.3)

- Spurt (arterial)
- Cast-off
- Drip trail

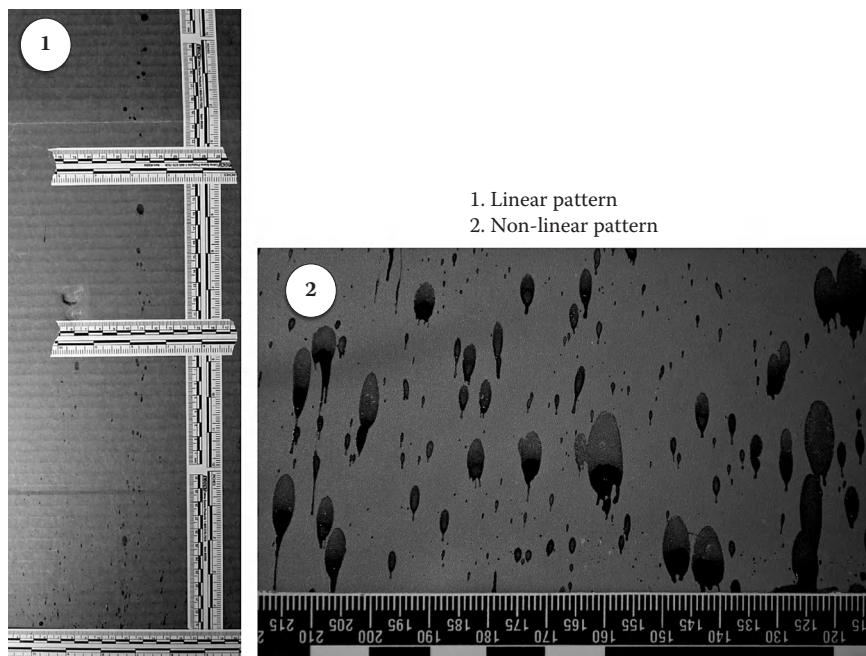


Figure 34.3 Linear and non-linear spatter patterns.

Non-Linear Spatter

- Impact
- Misting
- Expectorate
- Drip

Non-Spatter

Irregular Margin

- Blood into blood
- Gush
- Smear

Regular Margin

- Pattern transfer
- Flow
- Pool
- Saturation

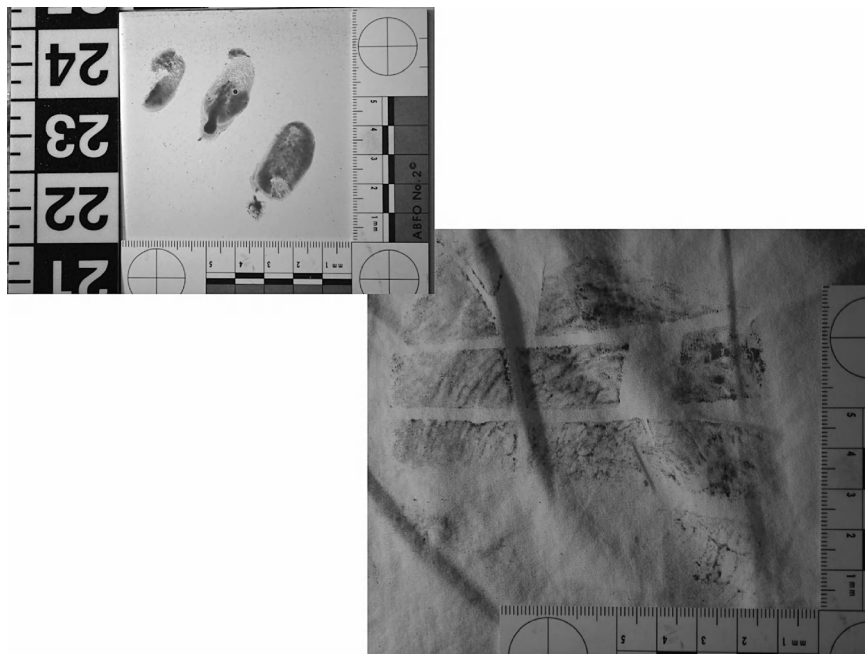


Figure 34.4 Non-spatter pattern.

Documentation

Bloodstain patterns are unique in the size and shape of the individual spatter, appearance of the overall pattern, location of the pattern, and location of the pattern in relation to the body and other patterns. Toby L. Wolson of the Miami-Dade Police Department's Crime Laboratory introduced a concept called "road mapping" that places patterns in context. The techniques introduced in this guide for handling bloodstains, bullet defects, and injuries are based on this technique simply called mapping.

Mapping

This technique works well on all surfaces within a scene, on clothing, and for bloodstains on a body.

- Take an establishing photograph of the item or surface containing the bloodstain.
- Take an additional photograph with a scale.
- Identify the discrete patterns on the surface with letter markers.
- Bracket the discrete patterns horizontally and vertically with a scale.



Figure 34.5 Establishing photograph of bloodstain pattern on body.

- Take an establishing photograph showing the overall scale and discrete pattern identifiers and scales (Figure 34.5).
- Take a photograph of each discrete pattern with a scale (Figure 34.6).
- Identify the spatter that will be used for area-of-origin determination and mark with designators (Pattern A, Stains A-1, A2, and A3).
- Bracket the discrete spatter with horizontal and vertical scales. Ensure the vertical arm of the scale is plumb.

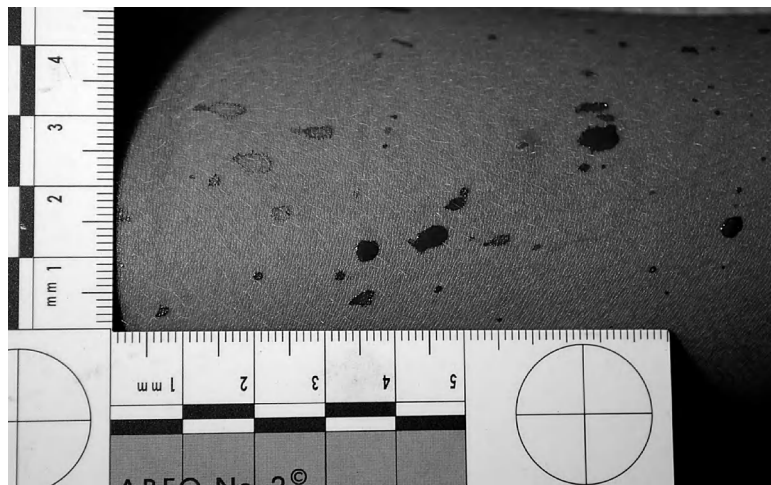


Figure 34.6 Discrete pattern with scale.

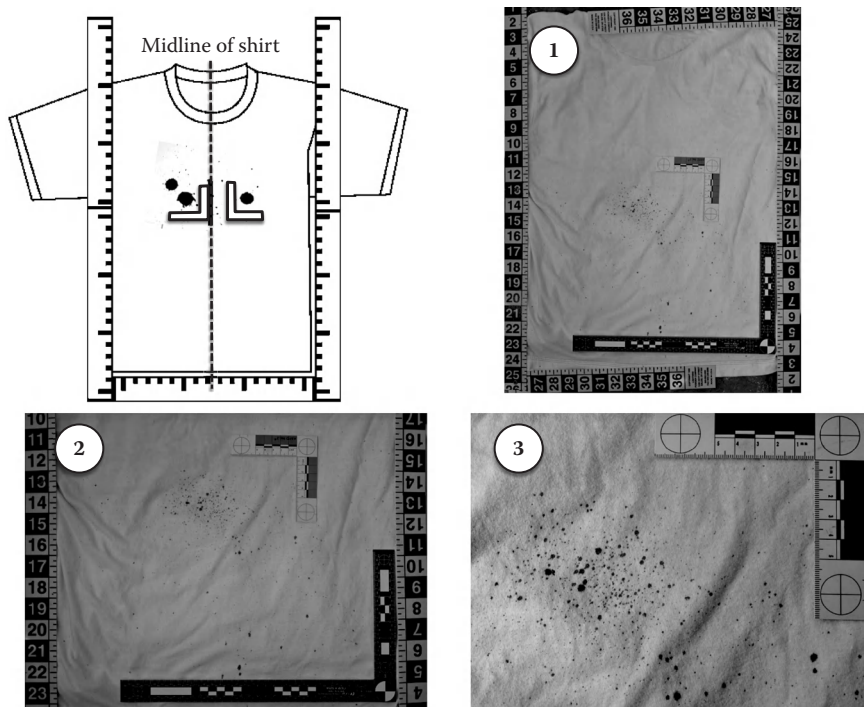


Figure 34.7 Photographic mapping of bloodstain pattern on clothing. (1) Overall view demonstrating location of pattern on shirt. (2) Mid-range view showing dimensions of overall pattern. (3) Close-up view demonstrating individual spatter within pattern.

- Photograph each bloodstain pattern with the individual stains identified and marked.
- Take an examination quality photograph of the identified discrete spatter within the pattern.
- Take a final establishing photograph of the item of evidence or surface containing bloodstains and include all identifiers and scales.

Clothing

Sequential mapping photographs should be taken of clothing items containing bloodstains (Figure 34.7).

Mapping Large Area Patterns

- It may be beneficial to divide a large surface with multiple bloodstain patterns into grid squares.

- Mapping may then be accomplished with the staining identified by the grid squares.

Photography

- Use a high resolution camera setting. You want to maximize the capture of details because you may later want to enlarge sections of the photographs for examination.
- Mount the camera on a tripod and use a shutter release remote.
- Ensure that the film plane is parallel to the surface to be photographed.
- Use a normal lens; do not use wide-angle lenses. Overlap the photographs if necessary for full coverage.
- Establishing photographs of the surface should demonstrate the relation of the surface to the floor, corner of the room, or other recognizable feature.
- Establishing photographs of the patterns should demonstrate the relationship to the surface and a recognizable feature or scale.
- A close-up photograph should be examination quality and include a metric, preferably L-shaped, scale to show heights and widths of stains.
- The L-shaped metric scale should be oriented with the vertical leg plumb. Alternatively, include a plumb line indicator on all examination quality photographs taken on horizontal surfaces.

Sketching

- An exploded view rough sketch showing locations of all bloodstain patterns should be made.
- The rough sketch should be transposed into a finished scale drawing including measurements and placements of bloodstain patterns within the scene.

Sampling and Collection

- Use the guidelines in Chapter 37 (Biological Evidence).
- Sample a minimum of six stains or spatter within a discrete pattern.
- If practical, remove wall, carpet, or ceiling sections containing blood stain patterns.
- Smaller patterns may be lifted using tape or clear contact paper and placed on panels the same size as the object they were removed from.

A fatal shooting scene offers unique challenges for a death scene investigator. Because firearms may be employed from a distance, the dynamic relationship between the shooter and victim may be difficult to ascertain. The wound path into the body, intermediate objects struck by the bullet, spent casings, and gunshot residue must all be properly documented to analyze a shooting scene properly.

Recovery of Firearm Evidence from Scene

Weapon

Safety: Paramount Concern

- If the weapon is inside an area secured by law enforcement, it should be properly documented and thoroughly photographed in place before movement or manipulation.
- If the crime scene is still dynamic (law enforcement control is marginal), the weapon should be quickly documented and made safe.

Firearm Documentation

- Photograph the weapon and show its location on a death scene sketch.
- Place the weapon in an unloaded and safe condition as you complete and document the initial examination. Use the Appendix F firearms documentation worksheet.
- Thoroughly photograph the weapon in place. Take close-up photographs of serial numbers, unique identifiers, and bloodstains.
- After ensuring the weapon is safe and before handling it, process it for touch DNA analysis (Chapter 37). Swab the handgrips and other areas you will have to handle to safely collect the weapon.
- The weapon should be handled with a gloved hand on its knurled surface or other area least likely to contain latent prints. It is not advisable to place any item into the barrel to facilitate collection.
- Photograph weapon surfaces that were not visible in its original orientation.

Ensuring Weapon Safety

- Do not act tentatively in an attempt to minimize handling. Firmly grasp the weapon as you would your own, remove the ammunition source and any rounds remaining in the chamber.
- In the rare case when a weapon cannot be unloaded at a scene, it must be carefully packaged to preclude accidental discharge. Label the container "Warning: Loaded Firearm." All personnel and facilities that will handle the weapon must be made aware of its loaded condition.

Processing Weapon at Scene

- Do not unload the magazine. Note the approximate number of rounds and apply Superglue® fume to the magazine with the bullets in place and the round ejected from the chamber.
- Sample discrete bloodstains adhering to the weapon after they have been thoroughly documented (Chapter 34).
- If possible, apply Superglue® fume to the weapon and all bullets removed from the weapon to preserve latent prints or touch DNA samples.

Collection and Packaging of Firearm

- The weapon must be packaged securely to prevent movement that may obliterate latent print, trace, or biological evidence.
- The weapon may be secured to a piece of cardboard with plastic ties or similarly immobilized in a special box made for this purpose.
- DO NOT package a weapon with ammunition!
- If blood, tissue, or other biological evidence is present, it must be thoroughly air dried before the weapon is packaged.

Recovery of Firearm from Water

- The weapon should be left in the water until all packaging materials are ready.
- Without removing the weapon from the water, it should be made safe as described above.
- The weapon should be packaged in a container filled with the same water from which it was seized. Air exposure should be minimal to retard rusting or further deterioration of the weapon.
- The weapon must be transported to a forensic laboratory as soon as possible.

Recovery of Casings, Cartridges, and Bullets

- Bullets should not be dug or pried from objects in which they are imbedded. The material or object containing the bullet should be collected.
- The locations of spent bullet casings should be carefully documented.
- Spent bullets should be sketched and documented individually. They should not be treated as a group in sketches or notes.
- Weapon, loaded ammunition, and additional loose or boxed ammunition of the same type and lot fired should be collected to assist in range-of-fire determinations.

Collection and Packaging of Bullets and Cartridges

- Bullet casings and bullets should not be marked in any way.
- They should be Superglue fumed, individually packaged in rigid containers, and the packaging should be marked.

Additional Analyses

- Bloodstain pattern analysis
- Shooting incident reconstruction
- Trajectory analysis

Documenting Bullet Defects

A bullet may strike, ricochet from, deflect from, travel through, or penetrate a variety of surfaces after firing. Each of these defects must be thoroughly documented.

- Each defect should be shown on a sketch and photographically mapped ([Figure 35.1](#)).
- If possible, defects should be designated sequentially (A1, A2, A3) to show their relationships as the bullet passed through multiple surfaces ([Figure 35.2](#)).
- The terminal location of the bullet should be thoroughly documented.
- Lead splash patterns are very useful when a bullet ricochets or is deflected from a surface. Latent lead splash can be made visible by reagent testing of a surface; it may not be visible in low volume ambient light or if deposited on a dark surface.
- Positive tests for copper and lead indicate defects caused by bullets. They also indicate directions of travel. Bullet wipe and lead splash occur on the entry side of a bullet hole.

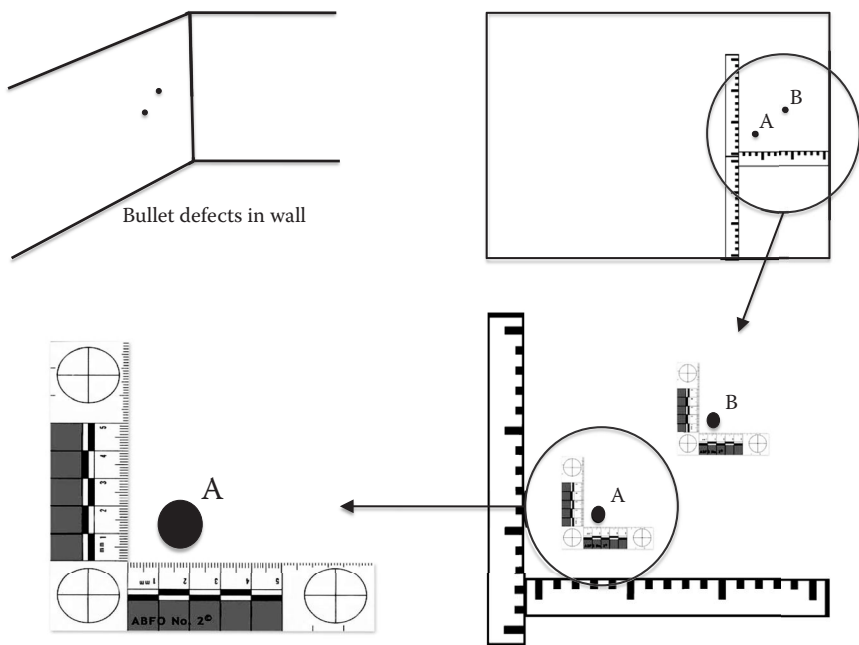


Figure 35.1 Bullet defect mapping.

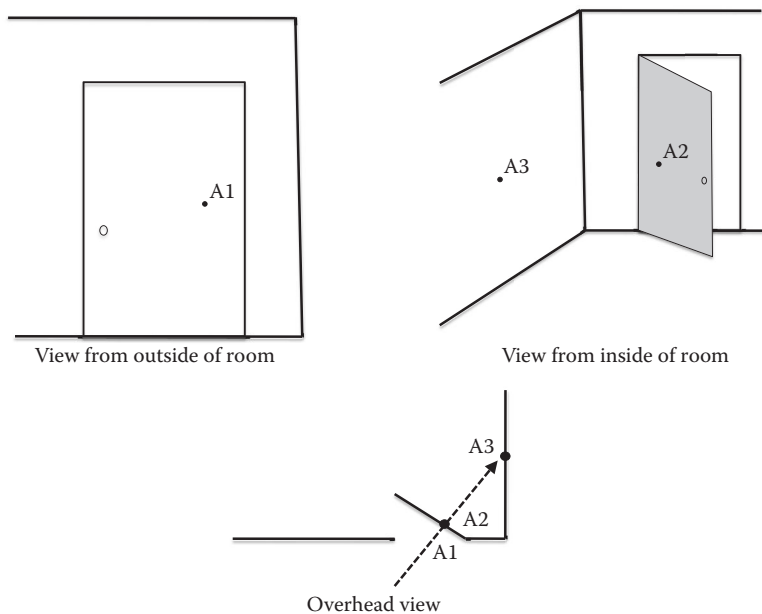


Figure 35.2 Labeling sequential defects from a single shot.

Chemical Testing for Bullet Defects

When a bullet comes in contact with a surface, minute amounts of metal may transfer from the bullet to the impacted surface. If the cause of a defect is uncertain, chemical testing may be done to detect copper and/or lead transferred by passage of a bullet.

Copper

- DTO and 2-NN testing for copper must be done before rhodizonate testing for lead.
- Dithiooxamide (DTO) is a colorimetric reagent that produces a gray-green color in the presence of copper.
- A solution of ammonium hydroxide is sprayed onto the absorbent side of plastic-backed filter paper.
- The wetted filter paper is then pressed against the suspect bullet defect. The hydroxide will solubilize the copper that is then absorbed onto the filter paper.
- The orange DTO solution is then sprayed onto the filter paper. If copper is present, a ring of gray-green will develop around the lifted defect pattern.
- The results should be photographed and the lift retained as evidence.
- If the ammonium hydroxide lift has a substrate color that obscures DTO results, 2-nitro-1-naphthol (2-NN) may be used instead of DTO.
- Using 2-NN on a lift containing copper produces a pink color. DTO is sprayed over the pink and will produce the positive gray-green color if copper is present. Each color change should be photographed and the lifts retained as evidence.

Lead

- Sodium rhodizonate is a chemical reagent used to test for the presence of lead.
- When a surface has dried after copper testing, rhodizonate testing for lead can be performed on the same area.
- This testing is non-destructive; further tests can be done on the same evidence.
- A colorless tartrate buffer solution is sprayed onto the surface to solubilize the lead.
- The orange-brown sodium rhodizonate solution is sprayed over the same area. If lead is present, an immediate color change to pink will occur.
- The results should be photographed.
- To confirm that a pink color change was caused by the presence of lead, 5% hydrochloric acid can be sprayed over the pink area or part

of the pink area. If the pink was produced by lead, it will change to a purple-blue.

- The results should be photographed and lifts should be retained as evidence.

Recovery of Firearm Evidence from Body and clothing

Detection of Gunpowder Patterns

Visual

- Gunpowder patterns may be visible around a bullet defect or on the hands or surface directly adjacent to a fired weapon.
- If visible, these patterns should be photographed.

Infrared (IR)

- IR videography and photography of darker colored items are excellent ways to reveal gunpowder patterns on darker surfaces (Figure 35.3).

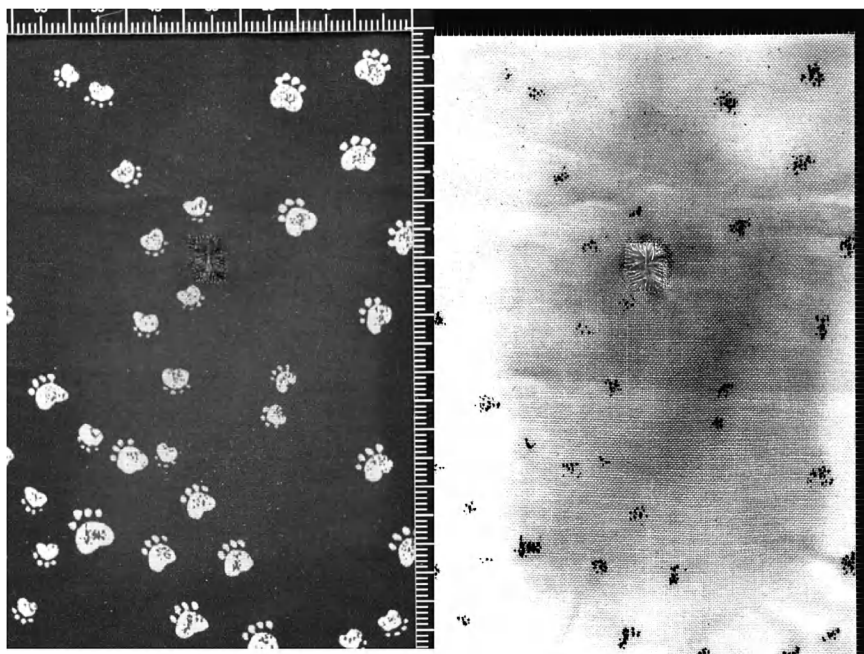


Figure 35.3 Dark print fabric showing gunpowder pattern photographed under regular and infrared lighting (Courtesy of Jeff Borngasser, Oregon State Central Point Crime Laboratory, Portland).

- Specialized IR cameras are available for forensic work. They are easy to use and produce excellent results.
- IR filters may be used on digital cameras. Less expensive cameras have built-in IR filters that may not capture patterns.
- IR filters on digital cameras require care in focusing. The IR focal point is different from the point for visible light. This may cause difficulty with auto-focus.

Collection and Packaging of Clothing

- Clothing may be removed at the scene only with the permission of the medical examiner. This permission may be in the form of an existing protocol used in cases in which bloodstain patterns or gunshot residue may be obscured or degraded by clothing remaining on a body.
- Always seize the victim's clothing as evidence. While powder may not be readily visible over the outer surfaces, microscopic examination may reveal fragments of powder in the weave of the material.
- A suspect's outer clothing worn at the time of the shooting should also be seized. Also seize gloves the suspect may have been wearing.
- Clothing with visible defects, gunshot residue, or bloodstain patterns should be photographically mapped (Figure 35.4).
- All clothing collected should be thoroughly air dried. If bloodstains are present, a piece of heavy paper placed between layers of fabric can prevent pattern transfer.

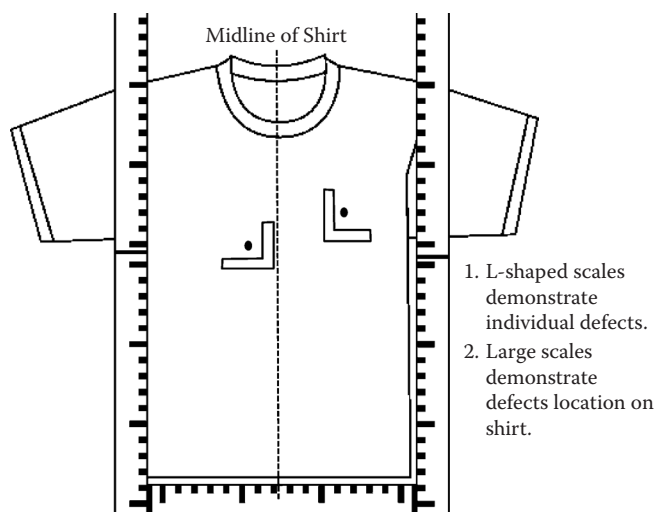


Figure 35.4 Mapping bullet defects in clothing.

- Clothing items should be packaged separately in paper containers.
- Weather and environmental conditions such as air movement and precipitation should be documented to assist in range-of-fire determination.

Documentation and Collection of Gunshot Residue (GSR)

- Any person believed to have handled the firearm should undergo GSR testing of his or her hands.
- The hands of a victim of what may be a self-inflicted wound should be sampled for GSR. This may be done at the scene with the medical examiner's approval or the hands may be bagged at the scene and the samples taken at autopsy.
- Use GSR analysis to determine whether a person handled, fired, or was in the immediate proximity of a weapon when it was discharged.
- Certain questions should be asked of subjects who undergo GSR examination and collection:
 - When was the last time you handled a firearm?
 - When was the last time you fired a weapon?
 - When was the last time you were present when a weapon was fired?
 - What was your proximity to the weapon?
 - When was the last time you washed your hands?
 - Are you right- or left-handed?

Gunshot Wounds of Suicide

Scene

- Indications of forced entry or a struggle are contrary to suicide.
- Void patterns in bloodstains that would indicate another person in a position to have fired the shot are contrary to suicide.
- A suicide note is an indicator of suicide, but notes are not found in most cases. The authorship of a suicide note must be authenticated.
- Items of religious significance may be associated with the body in a suicide.
- Photographs of loved ones, family members, etc., may be associated with the body.

Body

Mechanisms of Injury

- The victim must be physically capable of manipulating the weapon to fire the shot.
- If the victim was not physically capable of firing, search for a device or triggering mechanism that may have allowed the victim to fire the shot.
- The weapon must be functional and capable of firing.

Wound Dynamics

- Head, intra-oral, and chest (in that order) are the most common sites chosen for suicide with a firearm.
- Typical suicidal entrance wounds of the head are to the temple, intra-oral, under the chin, or between the eyes.
- The entrance wounds are usually in the contact or near contact range; suicidal gunshot wounds are rarely inflicted from an intermediate or distant range.
- Suicidal gunshot wounds typically do not appear on the back of the head or body.
- The most common sites of suicidal shotgun wounds are the temple, mouth, and chest.
- Most contact shotgun wounds of the head are suicidal.

Entomological Evidence 36

Analysis of insect activity and reproduction on human remains may help establish postmortem interval and determine whether a body was moved. Additionally, the pupae casings of insects that fed from the body may be used for toxicology analysis.

Adult and Flying Insects

- Collect with an insect net from the area immediately around and above the body.
- Place immediately into a 70% ethanol or isopropyl alcohol solution that has been further diluted 1:1 with water.

Collection of Crawling Insects

- Do not probe the body.
- Collect from the surface of the body using forceps or gloved fingers.
- Very small insects may be collected with an artist's brush moistened with the preservative solution.
- Place the collected specimens immediately into a 70% ethanol or isopropyl alcohol solution that has been further diluted 1:1 with water.

Collection of Maggots, Pupae, and other Immature Insect Forms

- Do not probe the body.
- Record the temperature of maggot masses on the body.
- Record the air temperature at body level.
- Record the surface temperature of the ground near the body (not at the body's interface with the ground).
- Collect the largest maggots visible from the surface and from within the body using forceps or gloved fingers.

- Place half the collected specimens immediately into a 70% ethanol or isopropyl alcohol solution that has been further diluted 1:1 with water.
- Place the remaining specimens in a breathable container with a lid. They should be placed on a piece of liver on top of a layer of vermiculite or potting soil. Do not mix different species in the same container to ensure preservation (carrion beetles will eat maggots). The insects in containers will be raised to maturity by a forensic entomologist for species identification. Transport the container to a forensic entomologist as soon as practical.

Collection of Insects in Soil

- Scoop soil into a zip lock plastic bag and chill. Transport to a forensic entomologist as soon as practical.
- Carefully examine the soil surrounding and beneath the body for insects, pupae, and pupae casings. Collect and preserve them as stated above.

Documentation

- Include a complete set of death scene photographs that clearly show surrounding vegetation and soil and terrain conditions. This information should be forwarded to the forensic entomologist who will perform the analysis.
- Obtain and record climatic conditions including minimum and maximum temperatures for 2 weeks preceding the discovery of the body, amounts and times of precipitation, wind speed and direction, relative humidity, and cloud cover. This information may be obtained from the National Weather Service.

Biological evidence on a body and at a scene is valuable for determining physical presence and actions. Handling biological fluids and stains is hazardous because of bloodborne pathogens. Hepatitis B virus (HBV) and human immunodeficiency virus (HIV) are of particular concern. Treat all biological fluids as sources of bloodborne pathogens. Appendix A details safety precautions. Appendix B contains a biological evidence notes worksheet.

Touch DNA Analysis

Touch DNA is an incidental transfer of genetic material (DNA) that occurs when an object is handled, touched, or brushed against. The DNA of the actor may be transferred through shed skin cells or body fluids containing DNA.

Detection

- The touch transfer is latent, not visible to the naked eye.
- Its possible location, and therefore collection point, is determined through an analysis of the evidence in context of the dynamics of movement within the scene.
- Obvious locations are the upper arms or wrists of a victim who was dragged by his or her arms.
- Other locations may be less obvious; all possible locations of touch evidence on the victim should be thoroughly explored.
- Touch DNA may also be sampled from latent fingerprint transfer areas that lack ridge details.

Preservation and Collection

- Touch DNA may be collected by multiple swabs of the suspected transfer area. The swabs should be moistened with distilled or sterile water and rubbed over the suspected area for at least 15 seconds.
- Cyanoacrylate (Superglue®) fuming to preserve latent prints also preserves touch DNA. Superglue fuming is ideal for preserving prints and DNA on weapons.

Biological Fluids and Stains

Biological fluids such as blood, semen, saliva, and urine may be left at the scene or on the body of the victim. These stains may be wet, dry, or pooled.

Detection

- Visual detection may be supplemented with strong oblique lighting. This is the least effective method.
- Ultraviolet lighting (350 nm) fluoresces semen, urine, and sometimes saliva.
- Semen, saliva, and urine will fluoresce when exposed to an alternate light source (ALS) tuned to 450 nm and viewed through orange goggles.
- Blood does not fluoresce when exposed to alternate light wavelengths. However, when exposed to 415 nm of light and viewed through yellow goggles, a bloodstain will absorb the light. The stain will resemble a dark hole in the background material.

Scene Analysis

- Typically, a stain found in an appropriate scene context is sufficient to indicate it is biological. A stain that looks biological and appears in an area where biological staining would be expected should be processed and collected. A presumptive test is not necessary.
- Stains may appear in such a context that their biological origin or forensic significance is questioned.
- Presumptive test kits may be used at a scene to establish a stain is blood, semen, or saliva. Depending upon the sophistication of the test used, it may indicate not only the presence of a stain but also if the stain is of human origin.
- Human-specific test kits are available for field use. These allow confirmation of a stain as human blood, semen, or saliva at a scene.

Collection of Biological Stains

Biological evidence is usually encountered in one of four conditions:

- Dry: appears crusty, contains no moisture
- Wet: damp stain or area of biological staining
- Liquid: pooled biological fluid
- Tissue: piece or fragment of tissue

General

- All stains should be thoroughly documented and photographed before collection. Include close-up photography without and with a scale. If you are illuminating with ultraviolet (UV) light, remove any “Skylight” or UV-protective filter from the lens.
- As collection progresses from one stain to another, the potential for cross-contamination should be minimized. Use disposable instruments for collection or clean instruments in a 10% household bleach solution for 5 minutes. Two pairs of gloves should be worn. The outer pair should be changed between unassociated stains or samples.
- Use a marker pen to circle suspected wet semen observable on sheets, items of clothing, or other objects. Stains may not be visible after they dry.
- If the stains are located on bedding, mark the side exposed during the assault and indicate which end was at the head and which was at the foot of the bed. Allow wet stains to air dry before folding the bedding.
- If the entire object is to be sent to a laboratory, no control sample is required. Otherwise, obtain a sample from an uncontaminated area on the surface where the stain was found.
- Before folding an item, place clean pieces of paper over stains to prevent cross-transfer of stains to other parts of the item. Fold around (not through) the stains.

Dry Stains

- Submit the entire item if practical, or cut out the section containing stains.
- Collect as much of each stain as possible.
- If the item cannot be seized or the stain cut out, collect dried stains with clean, moistened cotton swabs.
- Lightly moisten a cotton swab with distilled or sterile water (do not use saline solutions) and swab the stain.
- Saturate the cotton swab with as much of the sample as possible. It is important not to dilute the stain too much.
- Continue to saturate swabs with the stain until the swab comes away clean or until six to eight swabs have been collected.
- Air dry the swabs.
- Take an additional control swab, identically moistened, from an adjacent unstained area of the substrate and air dry it. Package it separately and label it as a control sample.

Wet Stains

- Submit entire item if practical, or cut out the section containing stains.
- Collect as much of each stain as possible.
- Allow stain to thoroughly air dry prior to packaging.
- If the item cannot be seized or the stain cut out, collect wet stains with clean cotton swabs.
- Saturate cotton swabs with as much of the sample as possible.
- Continue to saturate swabs with the stain until the swab comes away clean or until six to eight swabs have been collected.
- Air dry the swabs.
- Take an additional control swab; collect it separately and label it as a control.

Liquid Stains

- Withdraw a sample from the depth of a stain (not at the surface or at the bottom), using a pipette or syringe.
- Place sample in an EDTA test tube (purple top) for DNA testing. Gently mix by rocking test tube back and forth several times.
- Place sample in an ACD test tube (yellow top) for serology and alcohol testing. Gently mix by rocking test tube back and forth several times.
- Refrigerate sample and send to laboratory as soon as practical.
- An alternate, but less preferred, method is to collect liquid stains with a clean, cotton swab.
- Saturate swabs with as much sample as possible.
- Saturate and collect six to eight swabs.

Packaging

- All swabs should be thoroughly air dried and placed in labeled swab boxes. The swab boxes should be packaged in a porous bag or box.
- Swabs from the same collection sample may be packaged in separate swab boxes in the same secondary package.
- Swabs suspected to be from different stains or contributors must never be packaged together!
- Items of clothing or bedding that contain biological stains must be thoroughly allowed to air dry before packaging in a porous container.

- Biological stains should not be permanently packaged in non-porous containers (plastic bags). The only exception would be temporarily placing them in a non-porous container for transport to a drying area.
- The time in non-porous packaging should not exceed 2 hours.
- All items of evidence should be noted on the proper evidence custody document and entered into the evidence custody system.

Trace Evidence at the Scene

38

Trace evidence is very small and difficult to see on a body and elsewhere at a scene. Examples are hairs, fibers, paint chips, glass, building materials, and soil. Appendix B5 is a trace evidence notes worksheet.

General Processing Guidelines

- Trace evidence is usually searched for and collected before a scene is processed for fingerprints.
- Trace evidence is easily overlooked. Finding it requires a meticulous search.
- Avoid cross-contamination by thoroughly cleaning collection gear and changing gloves between samples.

Detection

- Magnification
- Oblique lighting
- Ultraviolet lighting
- Alternate light source

Collection

- Photograph the trace evidence with an evidence establishing photograph to place it in context with the scene.
- Photograph the trace evidence so that it fills the frame of the camera. This may require close-up rings or macro-photography equipment.
- Trace evidence on the body should be removed before the body is transported.
- Trace evidence at a scene may be seized with the item that contains it as long as the evidence will not be dislodged or lost in packaging or transit.
- Post-it Notes may be used to collect perishable trace hairs and fibers quickly. Write the collection information on the note and then use

the adhesive strip to collect the evidence. The note may then be folded over on itself to protect the trace evidence and placed in an envelope or other suitable container.

- Trace evidence items such as hairs and fibers are often easily collected with a gloved hand.
- Trace evidence may also be collected with rubber-tipped or disposable plastic forceps.
- Trace evidence may be tape lifted. Place the tape against a clear plastic surface such as a document protector.
- An evidence vacuum should be used only after other techniques have collected obvious trace evidence.

Packaging

Trace evidence must always be double packaged. The primary packaging should be the most effective packaging for the specific lifting method used.

- Druggist fold (Appendix H)
- Glassine envelope
- Avoid plastic bags. The static electricity that often builds on their surfaces makes them unsuitable for primary packaging.
- Trace evidence should always be double packaged.
- Paint chips should be packaged to maintain their edge defects for possible fracture matching. Do not package paint chips in cotton.
- Trace evidence-free samples of all materials should be taken to serve as controls.

Hairs

- Hairs may reveal origin (animal or human), region of body from which it came (head, pubic), removal (cut, pulled, shed), dyes, and treatments.
- DNA testing may be able to determine the source.
- Unique dyes or treatments may be consistent with a possible donor source.
- Hairs may be tested for drug toxicology or long-term heavy metal poisoning.
- Control samples from possible contributors should include about 20 pulled hairs from the head and pubic region. This may be best accomplished by using the appropriate sections of a sexual assault evidence recovery kit. Under most circumstances, hair should be collected by medical personnel as part of a sexual assault response team (SART) examination.

Fibers

- The first step is categorizing fibers: animal (wool, mink, fox), vegetable (cotton, linen), mineral and/or metallic (fiberglass insulation), or synthetics and blends.
- The treatment and unique origin of the a fiber may aid in determining its source or potential source.
- Control samples from carpeting, ropes, and other fibers that may have come in contact with the victim or suspect should be taken.

Paint

- Chips and transfers result when two objects come in contact and one or both have painted surfaces.
- Fracture matches of dried paint may allow a fragment to be matched to its origin. The layers built up after repeated paintings, may also be sufficiently unique to determine an origin.
- Paint evidence may be present in breaking-and-entering cases if a tool is used to pry open doors or windows.
- Paint from a scene may also be found on tools recovered from suspects.

Collection

- Collect paint chips.
- Collect small objects containing paint transfers.
- Cut out sections of larger objects containing transfers.

Control Samples

- Take control samples from an unmarked surface near the damaged area.
- Take a control sample all the way down to the unpainted surface.

Known Samples

- Collect the entire item or paint samples from the suspected source of the transfer.
- Take vehicle paint samples from several places around the damaged area.
- Sample the full thickness of paint, all the way down to the bare metal material.

Packaging

- Double pack chips in a pillbox or druggist fold, then in a plastic bag.
- Do not allow objects containing smears to contact other evidence.
- Seal known paint samples in separate containers.

Glass

- Glass may be broken or shattered during the commission of a crime. Close examination of the edges may indicate whether it was broken from inside or outside a structure. It may be possible to determine “staged” breaking-and-entering scenes by direction-of-force examinations.
- Glass evidence at a scene may reveal latent prints, fracture matching, direction of force, and sequences, velocities, and angles of impacts.
- When glass is broken, microscopic fragments travel backward toward the direction of force and may be found in the hair or on the clothing of a suspect.
 - Seize the clothing of the suspect.
 - Have the suspect comb his or her hair over a clean sheet of paper and collect the paper.

Collection

- Photograph and document the locations of glass and glass fragments on a death scene sketch.
- Collect the clothing of suspects and all glass at a scene including glass left in a window or door frame.
- Mark pieces removed from the frame to indicate which side faced inside.
- Collect a known sample of glass when needed for comparison with fragments recovered from a suspect.

Packaging

- Wrap large pieces separately in appropriate protective packaging materials.
- Pack small fragments together in a small container such as a druggist fold. Pack to prevent shifting during transit.
- Mark all glass samples with “FRAGILE” and “SHARP HAZARD.”
- Control samples should include glass from a window pane. Its orientation in the window should be noted (inside, outside, up, down, etc.).

Building Materials

Collection

- Collect suspect's clothing.
- Collect suspect's hair combings.
- Collect samples produced by suspected tools (wood chips, sawdust, metal filings).
- Collect a control sample from each layer of material the suspect would have passed through to gain entry to the area of the crime.

Soil

Soil samples collected via surface recoveries and burials may be critical in linking a suspect, a vehicle, victim, and location of a crime. It may be helpful to determine whether the soil found on clothes, tools, or automobiles may have come from a specific location. Soil examination by an expert may be helpful in such cases. Send the soil sample and a sketch showing where each sample was collected to the laboratory.

Collection

- Collect small items on which soil is found (shoes, tools, tires, floor mats, clothing).
- Scrape soil from larger items into a container using a clean instrument such as a razor blade. On large objects, if only trace amounts are available, collect a sample with adhesive tape.
- Samples should be taken from the area of interest and 3 and 15 feet from the area of interest, repeated along the north, south, east, and west coordinates.
- Collect only from the depth at which the activity occurred such as surface collection (down to about 1 inch), or at the various depths of a burial.
- Samples should be placed in individual canisters, jars, or plastic urine cups.

Known Sample

- Take at least eight soil samples from each area to be compared with the questioned soil. They should be taken 3 and 15 feet from the area of interest and repeated along the north, south, east, and west coordinates.

- Collect only from the depth at which the suspected sample was found.
- Samples should be placed in individual canisters, jars, or plastic urine cups.

Alibi Sample

- If a suspect claims he or she was at an alibi location when the crime was committed, sample the soil from the alibi area.
- These samples may then be compared to samples from the suspect's footwear, tire treads, and wheel wells and may indicate he or she was at the crime scene and not at the alibi location.

Packaging

- Dry soil before packaging.
- Wrap small items separately to prevent losses of soil.
- Pack scraped samples from larger items into film canisters, clean baby food jars, or plastic urine cups.
- Pack known and questioned samples in separate shipping containers.

Trace Metals

Trace metal examinations of suspected bullet ricochets, bullet holes in aircraft, and tool marks often yield valuable information. Field chemical testing of possible bullet defects may be warranted to process a scene appropriately.

Collection

- Seize items containing trace metals.
- Collect control samples of the same material from another location.
- Seize tools, bullets, or materials that may have made the mark as known samples.
- Pack samples to prevent accidental transfers.

Hazardous Materials

- Before collecting hazardous evidence, seek advice from the local HAZMAT team. In many cases, the team will collect, package, and store the evidence.
- Work closely with the team to ensure that proper chain of custody records are maintained.
- If you seize hazardous materials, follow the guidance of local environmental specialists to ensure safe collection and storage.

Friction Ridge Evidence at the Scene

39

Latent prints consist of friction ridge prints from fingerprints, palm prints, and/or footprints at the scene of a crime. They generally are processed by chemical or physical means to allow visualization, photography, and collection. Appendix B3 is a friction ridge evidence worksheet. Although chance friction ridge prints found at a scene may be called latent prints, it is technically correct to categorize them as:

- **Latent (not readily visible)** — Most prints found at a scene are latent. They require physical or chemical development to be visible.
- **Patent (visible)** — These appear in a contaminant (blood, dust, ink, oil, etc.) that contrasts with the substrate on which they are found.
- **Plastic (three-dimensional)** — Prints are impressed into putty, soap, or other pliable material.

Prints on Body

Latent or patent prints on a body may result from purposeful movement of the body, positioning of the body for display, or sexual assault. The perpetrator may grasp the body with ungloved hands and thus allow prints to be transferred.

Patent Prints (Visible)

- A patent (visible) print should be photographed immediately. Examination quality photographs with scale are critical.
- The contaminant that made the print (blood, grease, oil, lotion, paint) should be identified if possible.
- Oil-based contaminants are not likely to dry and flake. They will smear if handled.
- Bloody prints may dry and flake; they may also be obscured by continued blood flow from a body during movement and transportation.

Latent Prints

Detection

- Latent prints on a body are very difficult to visualize even under oblique lighting or an alternate light source.
- If sufficient force was used, bruising or discoloration patterns may indicate likely print areas, for example, visible finger marks on the neck of a strangulation victim.
- Bruising or discoloration from such injuries may also be visible through infrared video or photography.
- Prints may be found by using a lifting technique on likely areas for deposition and recovery.
- The most likely area for deposition is determined by examining the body in the context of the scene.
- If the body has been moved or dragged, determine the most likely area that would have been grasped by the perpetrator.
- If the body was positioned, for example by spreading the legs to indicate a sexual assault or post-incident staging or display, the inner surfaces of the thighs are likely surfaces for prints.
- Other likely recovery sites are smooth hairless surfaces such as the neck, inner arms, thighs, inner ankles.

Transfer Lift Method (Figure 39.1)

- The area identified as the most likely to contain prints must be cooled to about 75°F by blowing a small battery-operated fan across the skin surface.
- The transfer medium may be a piece of glass, polished metal, or metal mirror. The transfer medium should be warmed to about 85°F by placing a medical quick-heat pack or a commercially available hand warmer against its surface.
- The transfer medium is then rocked (in one direction only) across the cooled surface with firm pressure.
- The transfer medium may then be manipulated under a light to see whether the print image transferred to its surface.
- If the image of a print is visible (with or without ridge detail), the transfer medium should be Superglue fumed to preserve the print and any touch DNA that may have been transferred.

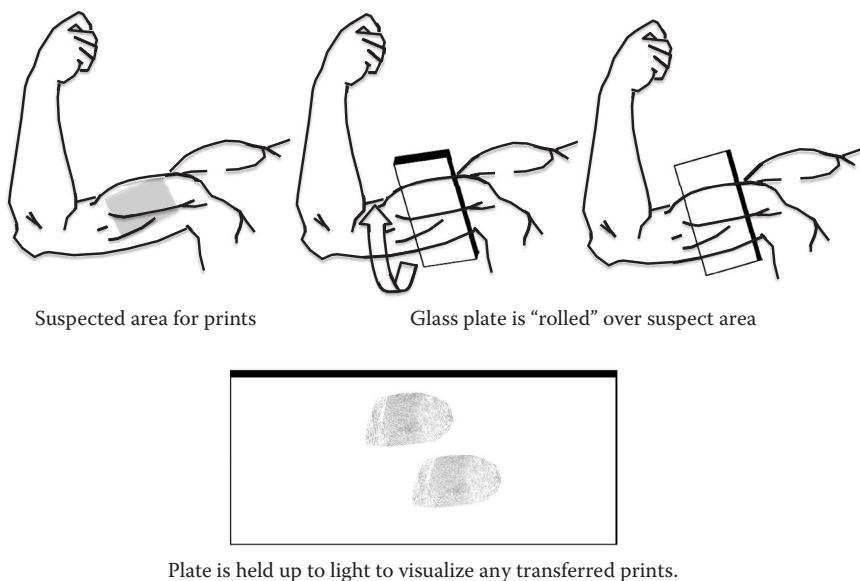


Figure 39.1 Transfer lift method.

Prints at Scene

General

- It is usually advisable to photograph and sketch a scene before examining items for prints, because processing for prints may require the moving of items.
- Process for prints after biological and trace evidence is processed.
- Use a systematic search for prints. Do not skip from one area to another.
- Remember to examine items inside other items found at the scene (for example, batteries inside a flashlight, the magazine inside a weapon, and foods and containers inside a refrigerator if prints were developed on the door).
- Elimination prints should be taken from persons with legitimate access to the area.

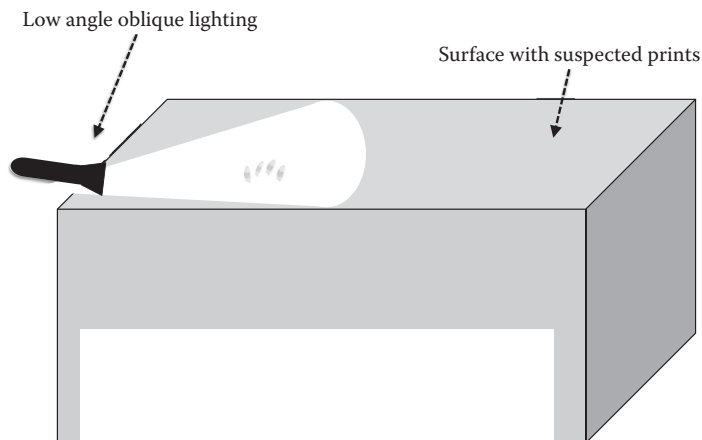


Figure 39.2 Detecting prints with low angle oblique lighting.

Detecting Prints

Oblique Lighting

- Reflected light (for example from a flashlight) held at a low oblique angle can help locate prints (Figure 39.2).
- Varying the angle of light will help locate prints.
- Prints that are not readily visible under reflected light may still be present. The area should be dusted or further processed to reveal prints.

Reflected Ultraviolet Imaging System (RUVIS)

- The system utilizes a short wave ultraviolet light source.
- A camera attached to the unit can see reflected UV wavelengths even in bright ambient light to allow photography of prints.
- RUVIS may reveal undeveloped prints on non-porous surfaces.

Alternate Light Sources

- Some fingerprints will inherently fluoresce.
- A general crime scene search wavelength of about 450 nm with orange goggles is appropriate for this type of search.

Photography of Prints

- Always photograph a print as soon as it becomes visible.
- Fill the frame with the print; 1:1 scale is preferred (Figure 39.3).
- Include a scale in photographs.

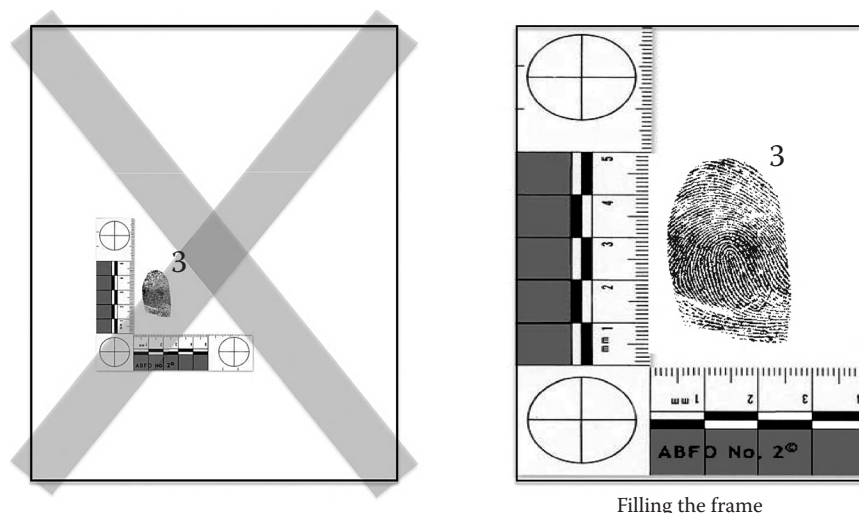


Figure 39.3 Fill the frame when photographing a fingerprint.

- Photograph at a 90-degree angle (perpendicular) to the print.
- Be aware of depth-of-field and other three-dimensional problems when photographing items that have curved surfaces.

Prints on Non-Porous Surfaces

- Items such as plastics, glass, and metals that do not absorb moisture are generally processed at the scene.
- Non-porous items at a scene are processed with fingerprint powders preferably after Superglue[®] fuming.
- Choose a powder that will contrast with the color of substrate being examined (dark powder on light surfaces, light powder on dark surfaces).
- Standard powders applied with a fiberglass brush can be used on most non-porous surfaces. Magnetic powders and a magnetic brush should be used on non-ferrous items. (Check a surface for magnetic properties by touching it with a magnetic wand.)
- If you are in doubt about proper processing of an item, contact your servicing forensic laboratory for guidance.
- Remove the item and forward it to a laboratory.
- Use a blank test on an area unlikely to contain fingerprint evidence. For example, when confronted with a coffee mug of unknown composition, obtain a similar mug at the scene, place your prints on it, and process it as a test.

Superglue (Cyanoacrylate) Fuming

- Superglue fuming at a scene is an excellent way to preserve prints and touch DNA.
- Items may be fumed in a portable fuming chamber at a scene.
- Entire rooms, vehicle interiors and exteriors, and large surfaces may be fumed by devising make-shift containers.
- A commercially available portable fuming chamber may be used or a chamber may be improvised at the scene, for example, items may be fumed in a large plastic trash can with a locking lid.
- The size and ambient temperature and humidity of a fuming chamber affect the amount of glue used. The amount of glue and exposure time of fuming in the field are based on experience.
- Cotton balls soaked in a solution of baking soda and water (a pound of baking soda dissolved in a gallon of water) and allowed to air dry completely can be used to accelerate the reaction. They are easily stored in a large plastic bag with other crime scene supplies.
- A black test card with a print on its surface is placed in the chamber where it can be readily viewed. This will serve as a test surface to indicate when fuming is sufficient.
- A small aluminum tin containing several treated cotton balls is placed in the bottom of the chamber. At least 10 to 15 drops of Superglue® are dripped onto the cotton balls. The reaction should be visible within moments as the cotton balls begin to emit visible fumes. The chamber is then sealed.
- Evidence should not be over-fumed. A lightly visible white print on the black fingerprint card is sufficient. At that point, remove the lid and allow the items to set up for a few minutes before photographing visible prints and packaging the evidence.
- Superglue® fumes may be irritating to the eyes and lungs. Be cautious when working near the fumes. Do not utilize field fuming if you wear contact lenses.

Prints on Porous Surfaces

- Paper, unfinished wood, and other items that absorb moisture are best photographed, seized, protected, and forwarded to a laboratory for further processing. Advanced chemical techniques may be required to develop prints.

Chemical Development of Latent Prints

- Wet surfaces should be air dried and processed in the recommended manner for the surface.
- If a wet non-porous surface must be processed for prints immediately, MOS₂ (Wet Print) may be sprayed on the surface, allowed to stand about a minute, and then gently rinsed off. The subsequently developed print must be photographed. It cannot be lifted while wet but if allowed to dry may be tape lifted.
- Patent prints in blood on non-porous surfaces may be treated with amido black or another suitable dye stain, allowed to stand about a minute, and then gently rinsed off. The print developed must be photographed; this is the best method of documentation. A gel lifter may be used to attempt to lift the print.
- Patent prints in oil or grease on non-porous surfaces may be treated with Coomassie Blue or another suitable stain, allowed to stand about a minute, and then gently rinsed off. The print developed must be photographed; this is the best method of documentation. A gel lifter may be used to attempt to lift the print.

Latent Prints on Non-Porous Surfaces

- After photographing prints that become visible, use standard lifting tape to recover and protect the prints. If the print is not successfully lifted, the photograph may become your evidence.
- Prints on curved and textured surfaces may be recovered by standard tape, but gel lifters and polyethylene tape usually recover more ridge detail.
- The tape with the lifted print should be placed on a contrasting card annotated with the time, date, investigator's initials, a description of the item from which the print was taken, and a sketch of the print's relative location on the item.

Packaging Latent Print Evidence

Non-Porous

- When seizing items that have not yet been processed, secure them within containers so that they cannot move and no other items can rub against them in transit. Always protect prints by Superglue® fuming at the scene, if possible.
- Do not place items in plastic bags or containers.
- Clearly label containers with "PRESERVE FOR LATENT PRINTS."

Porous

- When seizing items that have not yet been processed, secure them within containers so that they cannot move and no other items can rub against them in transit.
- Papers to be preserved for latent print development and questioned document examination may be placed in clear document protectors.
- Clearly label containers with "PRESERVE FOR LATENT PRINTS."

Toolmarks and Bites

Tools and other objects (screwdrivers, hammers, wire cutters, teeth) that contact soft substances create three-dimensional marks that reveal the class and individual characteristics of the objects that made them. Bite marks at a death scene may be found on the body of the victim, on gags or items forced into the victim's mouth, or on food eaten at the scene. Toolmarks may have been caused by blunt force or sharp force injury of the victim and may also be present at the scene if forced entry was made. Appendix B4 is an impression evidence notes worksheet.

General

- These impressions may contain trace evidence such as saliva, paint, and metal chips.
- Do not place a tool into a toolmark to see whether it fits.

Detection

- The medical examiner will examine blunt force and sharp force traumas to underlying bone surfaces. These surfaces may be documented and cast as with any other toolmark to preserve their shapes and sizes.
- Carefully examine areas of forced entry or damage where tools may have contacted softer objects.
- Oblique lighting may help locate subtle, shallow marks.

Photography

- Toolmarks should be photographed in place before processing because recovery and processing of impressions may alter or destroy them. Bite marks and food must be processed expeditiously. The marks may fade; the food composition may change.
- Mount the camera on a tripod, use a remote shutter, release and aim perpendicular to the impression.

- The impression should fill the frame.
- In bright sunlight, the impression may have to be shaded for proper photography.
- Initial photographs should be taken without scale.
- Next, items such as paint chips and metal fragments that are not imbedded in the impression may be carefully removed and seized as trace evidence (Chapter 38).
- Low angle oblique lighting will help highlight impressions.
- Using an off-camera flash or strong flashlight, direct the light at a low angle across an impression. Using a flashlight first will help to determine the most effective flash angle.
- Photograph the impression under oblique lighting from each side.
- Be aware of depth-of-field requirements for three-dimensional impressions.
- The scale should be located on the same plane as the impression.

Processing and Casting Toolmarks

- If possible, the item containing the impression should be seized if moving the item would not damage the impression.
- If this is not practical, the impression may be cast after detailed photography.
- Use a casting compound such as Mikrosil® and follow the manufacturer's directions.

Bite Marks: Special Considerations

- Seek medical attention for bite marks that break the skin of a living individual.
- Bite marks in living individuals are perishable and fade quickly. Process them immediately.
- Photograph as detailed above.
- Swab for saliva inside and outside the dental arch (Figure 40.1).
- Photograph bite mark again, and consider using IR or UV lighting (Figure 40.2).
- Consider re-photographing the mark over time.
- Cast the mark if possible.
- If a bite mark is found in a food item, do not allow the item to dry. Photograph and cast it as soon as possible.
- A bite mark on a deceased individual may be removed and preserved at autopsy.

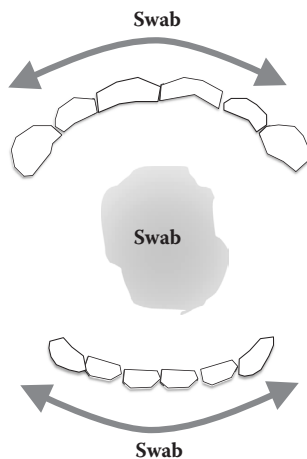


Figure 40.1 Figure indicates the areas of the mouth that should be swabbed for DNA.

Footwear and Tire (Three-Dimensional) Impression Evidence

General

- As you walk through a scene, you may obscure impression evidence left by a suspect. Always use paths of travel not likely to have been used by a suspect until the areas have been examined.
- Keep nonessential personnel out of a scene. Wear protective footwear while processing a scene. Death scene investigator should use new booties whenever they enter or reenter the scene to minimize contamination.
- Thorough measurements and documentation of distances between impressions and their relationships to each other, may provide

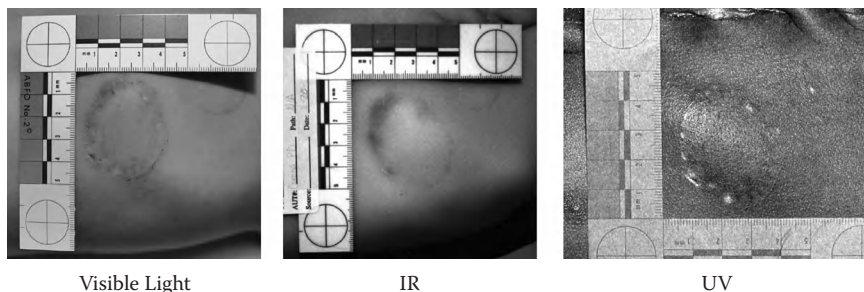


Figure 40.2 Measurements and documentation of distance between impressions as shown here, may provide information concerning a perpetrator's gait.

valuable information about gait of the perpetrator and the wheel base or axle length of a vehicle.

- Casting impressions in mud, sand, snow, or water requires specialized techniques.
- Do not attempt to fit the item suspected of having made the impression into the impression. Doing so will cross-contaminate trace evidence and alter the impression.

Detection

- Three-dimensional prints should be fairly obvious by inspection of likely areas.
- Oblique lighting may be helpful for locating very shallow impressions.

Photography

- Impressions should be photographed in place before processing because processing and recovery may alter or destroy them.
- The camera should be mounted on a tripod with a shutter release remote; aim perpendicular to the impression.
- The impression should fill the frame.
- In bright sunlight, the impression may need to be shaded for proper photography.
- Initial photographs should be without scale.
- Next, large items (twigs or leaves) that appear non-evidentiary and are not imbedded in the impression may be carefully removed.
- Low angle oblique lighting will help highlight the impression.
- Using an off-camera flash or strong flashlight, direct the light at a low angle across the impression. Using a flashlight first will help determine the most effective flash angle.
- Photograph the impression under oblique lighting from each side.
- Be aware of depth-of-field requirements for three-dimensional impressions.

Processing and Casting

- If possible, the item containing the impression should be seized if it would not damage the impression. If this is not practical, the impression may be cast after detailed photography.
- Dental stone or dye stone is recommended as a casting agent. These substances require no reinforcement, show better detail, do not shrink, and set up even underwater.

- The casting material may be easily mixed in a large zip lock bag prepared with about 2 pounds of casting material. One bag should be sufficient for one footwear impression. Far larger quantities are required for tire marks.
- Add to 12 ounces (a soda can full) of water; mix thoroughly by kneading the bag. This is a general guideline. Refer to the manufacturer's instructions for exact directions.
- The resulting mixture may need adjustment until it is about the consistency of pancake batter.
- Framing is not necessary with these materials unless unusual terrain conditions exist.
- The mixture should be poured to the side of the impression and allowed to run into it.
- The impression should be completely covered on the first pour. More mixture may be added to obtain a thickness about $\frac{3}{4}$ to 1 inch.
- After the cast sets, use an indelible marker to record relevant data and draw an arrow indicating north.
- The cast should be allowed to set about 30 minutes before removal. Do not clean adhering sand, dirt, or other particles from the surface. This will be done at the laboratory.
- Allow the cast to air dry for 24 to 48 hours before preparing for transport to the laboratory.

Impressions in Snow

- **Primary method** — Spray the snow with commercially available spray wax. This fixes the impression and insulates it from the casting material.
- **Secondary method** — Using a flour sifter, sift two or three light coatings of dry dental stone into the impression and moisten each coating with a fine mist of water.

Tire Marks: Special Considerations

- Prepare the casting mixture following the same procedures used for footwear impressions.
- Castings should be made in 18 inches segments and 6 to 9 feet long overall to cover the total tire circumference.
- The full depth of a tire mark should be cast; sidewalls often contain important details.
- The cast will feel warm as it dries. Do not attempt to lift it until it is completely cool and dry.

- Mark the cast with initials, date, item number; indicate north with an arrow before lifting.
- Carefully work your fingers under the edge of the cast.
- Slowly and carefully work back and forth and along the length until the cast is free.
- Do not remove dirt or other matter adhering to the cast; the laboratory will do that.

Packaging

- Package casts in separate cardboard containers.
- Ensure that each cast is secured and will not slide back and forth within the container.
- Do not clean off the surfaces of casts.

Footwear and Tire (Two-Dimensional) Impression Evidence

Two-dimensional impressions or dust prints appear when the dust or contaminant on footwear or a tire is transferred to a surface such as a floor or road. They may also appear on the clothing or body of a stomping victim. These prints are very fragile and should be considered perishable evidence requiring priority processing.

Photography

- Impressions should be photographed in place as soon as revealed. Subsequent processing and recovery may alter or destroy them.
- The camera should be mounted on a tripod and aimed perpendicular to the print.
- The print should fill the frame.
- Low angle oblique lighting will help highlight the print.
- Photograph prints with and without a scale.
- Use an electrostatic dust print lifter, gel lifters, or wide tape to lift prints from a hard surface.

Detection

- As with fingerprint searches, areas likely used by the suspect should be examined. Start by examining the point of entry, areas to, from, and around the points where physical evidence was found, and points of exit.

- Hard outdoor surfaces may also contain two-dimensional impressions that should be processed quickly to avoid losses from rain, snow, and other factors.
- The use of powerful oblique lighting at very low angles to the surface will help locate two-dimensional prints (Chapter 39).
- Impressions that may not be readily visible or made visible under oblique lighting may be revealed by screening with an electrostatic dust print lifter.

Processing

Electrostatic Dust Print Lifter

- The metallic film from the dust print lifter is placed black side down over a suspected two-dimensional impression.
- Follow the manufacturer's instructions about procedure and safety. The charging lead of the unit is placed onto the metallic top surface of the film.
- The grounding lead is placed on a metal ground plate near (not touching) the metallic film.
- Do not touch any part of the grounding plate or film with your body.
- Power up the unit starting at the lowest setting and gradually increasing power until the film begins to adhere to the surface. Continue until the film tightly adheres to the surface.
- Using the wooden handled rubber roller provided with the kit gently roll the film across the suspected print while ensuring tight contact.
- Reduce power.
- Turn unit off and remove from film.
- Release residual static charge with provided static wire.
- Turn film over carefully and inspect with oblique light to view two-dimensional impression.
- Photograph the impression.
 - In darkness with camera on a tripod and image filling the frame, use timed exposures at 5, 10, 15, and 20 seconds.
 - During exposure, move a flashlight beam completely across the image at a very low angle.
 - Do not pivot the flashlight back and forth; pivoting creates hot spots where the light originates.
 - Make sure as you move the light back and forth that the beam comes completely off the film as it passes from left to right; this prevents burn-out at the edges.

- It is possible but not recommended to secure the completed metallic film in a box. As the static charge dissipates over time, the dust impression will no longer adhere to the film. The best method for preservation is photography.

Stati-Lift®

- Stati-Lift is similar to the electrostatic device, but the metallic film already has a static charge. The technique does not require a power source and may be safely used on a living body to detect stomp marks and tire marks.
- The film is pulled away from its plastic cover sheet; this completes the static charge and exposes the black film surface.
- The black side of the film is laid carefully over the suspected impression and the film is carefully rolled with a 4-inch rubber roller.
- The film is turned over carefully. Do not replace the plastic cover sheet yet! Inspect the film with oblique light to reveal the two-dimensional impression.
- Photograph using the same technique used for electrostatic dust print lifts.
- Replace plastic cover.

Gel Lift

- Choose a gel that will contrast with the suspected contaminant.
- Carefully pull off the protective plastic cover sheet and expose the gel.
- Place the gel side of the matrix carefully over the suspected impression and carefully roll out the film with a 4-inch rubber roller.
- Turn the gel over. Do not replace the plastic cover sheet yet! Inspect the gel. If the impression is evident, photograph as described above.
- If the impression not readily visible, search with oblique light.
- Replace plastic cover after photography.

Tape Lift

- If other means are not available, a two-dimensional impression may be lifted with tape and placed on a contrasting card.
- Apply a base layer of the widest tape available below the short axis of the impression.
- Carefully run a strip of tape overlapping the base layer along the full length of the impression.
- Repeat as many times as necessary allowing each piece of tape to overlap the adjoining piece at least ¼ inch.

- When the entire impression has been taped, gently lift the tape starting with the base tape at the side of the last overlapping run.
- You should be able to lift all the tape as a single piece. Apply it to a contrasting surface card.

Moist Impression

Two-dimensional moisture impressions are made when an individual walks or drives a vehicle on a wet surface (puddle, wet grass) and then moves onto a dry firm surface. These prints are very transitory and should be photographed immediately upon discovery. The prints will be visible only until the moisture evaporates. These prints should be treated as perishable evidence requiring priority processing.

Processing: Wet

If a print is believed to have been made by a transfer of blood or an oily contaminant, collect a sample and use chemical staining such as amido black or Coomassie Blue (see Chapter 39 regarding latent prints). Immediately photograph prints at mid-range to demonstrate their spatial relationship and orientation to the scene.

- Photograph at 90 degrees and fill the frame with the impression. Photograph again with whatever scale is available and continue to photograph with scale as the print disappears.
- When dry, process the area as described below.

Processing: Dry

- Process with contrasting powder as you would a latent print.
- After development, photograph the print with and without scale.
- Collect print by lifting with gel or wide tape.

Packaging

- If the item containing the print is collected, package it to prevent contact of the print with packing or other materials.
- Gel and tape lifts should be secured in cardboard boxes.

Appendix A: Universal Precautions for Blood Borne Pathogens

Universal precaution — All biological material must be assumed to be contaminated.

Potentially infectious materials — A variety of harmful microorganisms can be transmitted through body fluids, including the hepatitis B virus (HBV) and the human immunodeficiency virus (HIV). Both HBV and HIV are transmitted through broken skin or mucous membrane contact but not via casual contact. Be alert for infectious materials at all death scenes.

Occupational Safety and Health Administration (OSHA) requirements — Your organizational protocols should comply with 29 CFR 1910.1030 (Bloodborne Pathogens), particularly for death scene investigators who face occupational exposure risks. Contact your local public health office for guidance.

Personal protective equipment (PPE) — Determine the appropriate combination of protective equipment. Consult medical specialists if you are unsure about appropriate PPE.

- Wear double gloves when handling infectious materials or infectious material containers.
- Wear full body overgarments when the splashing or spread of contaminated materials or body fluids is possible (scenes involving large amounts of blood, body fluids, or tissues). Full body coverage requires wearing a hood, surgical mask, and eye protection in contaminated areas.
- Use disposable booties if boots are not attached to the overgarment. Use disposable shoe coverings to prevent transport of contaminated fluids to vehicles, offices, and homes.
- Wear double latex gloves when processing a scene.
- Wrap duct tape or other suitable tape around wrists and ankles to secure sleeves to glove tops and overgarments to booties.

- Remove PPE before leaving an immediate death scene for any reason. Wash hands thoroughly with water and germicidal soap when leaving. Put on fresh or decontaminated PPE before reentering the scene.

Evidence collection safety — Presume all blood, body fluids, body tissues, sexual assault kits, used medical supplies, biological wastes, and drug paraphernalia are infectious. Other evidence at sexual assault, drug, assault, bodily injury, arson, and death scenes may also be infectious. Attach biohazard labels to all containers of potentially infectious materials.

- Control access to death scenes that contain potentially infectious materials. Limit access to only those who have an official need to enter.
- Pregnant investigators should not process death scenes where potentially infectious materials are present.
- Liquid blood, body fluids, and body tissue samples should be put into leak-proof containers. Place the containers in sealable plastic bags for secondary containment. Some body fluids, especially blood and saliva, may need to be collected by a different method and air dried. See Chapter 37.
- Be alert for sharp objects. Exercise extreme caution when handling needles, syringes, knives, razors, broken glass, nails, and other sharp objects. Mark “SHARP HAZARD” on containers for these items. Attach biohazard labels if required.
- If you are cut or your skin is punctured by a contaminated item, immediately cleanse the wound with an appropriate antiseptic and seek medical assistance.
- After processing a potentially infectious death scene, release the scene to the appropriate authorities responsible for decontamination of such scenes.

PPE removal and decontamination — Before leaving a scene, place a large piece of paper or plastic or a bed sheet on the floor of an unaffected area of the death scene near the perimeter. Stand in the center of the paper, plastic, or sheet. Remove each piece of PPE in the following order and ensure it remains on the paper, plastic, or sheet:

- Duct tape if worn
- Outer gloves if gloves are doubled
- Booties if separate from overgarment
- Surgical mask

- Eye protection
- Inner gloves (grasp wrist edge of first glove and pull it off inside out; remove second glove by sliding two fingers beneath the wrist of the second glove and pulling it off inside out: the two fingers should touch only touch the inside of the second glove)

Decontaminate reusable PPE and equipment by hand washing the surfaces of each item with a solution of water and chlorine bleach (1 cup bleach to 1 gallon water). Let items air dry.

Place disposable PPE in a biohazard bag for disposal (bags are usually red or orange and designated with a biohazard symbol on the fronts). Wear protective gloves and eye protection when decontaminating.

Dispose of reusable PPE as infectious waste if it becomes damaged, saturated with infectious material, or otherwise unusable.

Ask medical specialists to dispose of infectious waste such as pens, pencils, gowns, gloves, masks, and shoe covers by incineration.

Appendix B: Death Scene Notes

TITLE: _____ DATE: _____

CASE NUMBER: _____ INVESTIGATOR: _____

TIME OF NOTIFICATION: _____ TIME OF ARRIVAL: _____ TIME OF DEPARTURE: _____

1. CRIME SCENE SURVEY - NOTES:

[illegible]

3. SUPPLEMENTAL REPORTS:

- | | |
|---|---|
| <input type="checkbox"/> DEATH SCENE ENTRY LOG | <input type="checkbox"/> BIOLOGICAL EVIDENCE |
| <input type="checkbox"/> PHOTOGRAPHY LOG | <input type="checkbox"/> FRICTION RIDGE EVIDENCE |
| <input type="checkbox"/> DEATH SCENE SKETCH | <input type="checkbox"/> TRACE EVIDENCE |
| <input type="checkbox"/> BODY SKETCH | <input type="checkbox"/> IMPRESSION EVIDENCE |
| <input type="checkbox"/> FIREARMS EVIDENCE | <input type="checkbox"/> TOOLMARK EVIDENCE |
| <input type="checkbox"/> IMMERSION BURN WORKSHEET | <input type="checkbox"/> BITEMARK EVIDENCE |
| <input type="checkbox"/> POST BLAST WORKSHEET | <input type="checkbox"/> BLOODSTAIN DOCUMENTATION |
| <input type="checkbox"/> IMMERSION BURN WORKSHEET | <input type="checkbox"/> SHOOTING DOCUMENTATION |

4. MISCELLANEOUS COMMENTS:

PAGE of

INITIALS _____

Appendix C: Death Scene Notes: Supplemental

TITLE: _____ DATE: _____

CASE NUMBER: _____ INVESTIGATOR: _____

Supplemental Notes:

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

PAGE ____ of ____

INITIALS _____

Appendix D: Biological Evidence Notes

TITLE: _____ DATE: _____

CASE NUMBER: _____ INVESTIGATOR: _____

[] SAMPLE

☐ Dry ☐ Wet ☐ Liquid ☐ Tissue

DETECTION METHOD:

☐ Visible ☐ Oblique ☐ UV ☐ FLS

COLLECTION METHOD:

☐ Swab ☐ Pipette ☐ Swatch
☐ Scraping ☐ Forceps ☐ Seize Item

PACKAGING METHOD:

Test Tube: ☐ Purple Top ☐ Druggist Fold
☐ Yellow Top ☐ Envelope
☐ Gray Top ☐ Other _____

PRESUMPTIVE TEST:

☐ Positive ☐ Negative ☐ Type: _____

LOCATION:

[] SAMPLE

☐ Dry ☐ Wet ☐ Liquid ☐ Tissue

DETECTION METHOD:

☐ Visible ☐ Oblique ☐ UV ☐ FLS

COLLECTION METHOD:

☐ Swab ☐ Pipette ☐ Swatch
☐ Scraping ☐ Forceps ☐ Seize Item

PACKAGING METHOD:

Test Tube: ☐ Purple Top ☐ Druggist Fold
☐ Yellow Top ☐ Envelope
☐ Gray Top ☐ Other _____

PRESUMPTIVE TEST:

☐ Positive ☐ Negative ☐ Type: _____

LOCATION:

[] SAMPLE

☐ Dry ☐ Wet ☐ Liquid ☐ Tissue

DETECTION METHOD:

☐ Visible ☐ Oblique ☐ UV ☐ FLS

COLLECTION METHOD:

☐ Swab ☐ Pipette ☐ Swatch
☐ Scraping ☐ Forceps ☐ Seize Item

PACKAGING METHOD:

Test Tube: ☐ Purple Top ☐ Druggist Fold
☐ Yellow Top ☐ Envelope
☐ Gray Top ☐ Other _____

PRESUMPTIVE TEST:

☐ Positive ☐ Negative ☐ Type: _____

LOCATION:

PAGE ____ of ____

INITIALS ____

Appendix E: Friction Ridge Evidence

TITLE: _____ DATE: _____

CASE NUMBER: _____ INVESTIGATOR: _____

[] PRINT

☐ Finger ☐ Palm ☐ Lip ☐ Foot
☐ Partial ☐ Unknown

LOCATION:

DETECTION METHOD:

☐ Visible ☐ Oblique ☐ UV ☐ FLS

PROCESSING METHOD:

☐ Standard Powder ☐ Magnetic Powder ☐ Fluorescent
☐ Black ☐ White/Gray ☐ Bichromatic ☐ Fluorescent
☐ Cyanoacrylate Fuming

COLLECTION METHOD:

☐ Photograph ☐ 35mm ☐ 1:1 ☐ Polaroid
☐ Tape ☐ Gel Lift ☐ Mikrosil ☐ Seize Item

[] PRINT

☐ Finger ☐ Palm ☐ Lip ☐ Foot
☐ Partial ☐ Unknown

LOCATION:

DETECTION METHOD:

☐ Visible ☐ Oblique ☐ UV ☐ FLS

PROCESSING METHOD:

☐ Standard Powder ☐ Magnetic Powder ☐ Fluorescent
☐ Black ☐ White/Gray ☐ Bichromatic ☐ Fluorescent
☐ Cyanoacrylate Fuming

COLLECTION METHOD:

☐ Photograph ☐ 35mm ☐ 1:1 ☐ Polaroid
☐ Tape ☐ Gel Lift ☐ Mikrosil ☐ Seize Item

[] PRINT

☐ Finger ☐ Palm ☐ Lip ☐ Foot
☐ Partial ☐ Unknown

LOCATION:

DETECTION METHOD:

☐ Visible ☐ Oblique ☐ UV ☐ FLS

PROCESSING METHOD:

☐ Standard Powder ☐ Magnetic Powder ☐ Fluorescent
☐ Black ☐ White/Gray ☐ Bichromatic ☐ Fluorescent
☐ Cyanoacrylate Fuming

COLLECTION METHOD:

☐ Photograph ☐ 35mm ☐ 1:1 ☐ Polaroid
☐ Tape ☐ Gel Lift ☐ Mikrosil ☐ Seize Item

PAGE ____ of ____

INITIALS ____

Appendix F: Impression Evidence Notes

TITLE: _____ DATE: _____

CASE NUMBER: _____ INVESTIGATOR: _____

[] IMPRESSION

☐ Foot Print ☐ Foot Wear ☐ Tire Print ☐ Toolmark ☐ Bitemark
☐ Soil ☐ Sand ☐ Mud ☐ Underwater ☐ Snow

PHOTOGRAPHY: ☐ Without Scale ☐ With Scale

CASTING METHOD:

☐ Dental Stone ☐ Alginate ☐ Tape ☐ Stai-lift
☐ Mikrosil ☐ Silicon Rubber ☐ Snow Print Wax ☐ Electro-Static Print Lifter

[] IMPRESSION

☐ Foot Print ☐ Foot Wear ☐ Tire Print ☐ Toolmark ☐ Bitemark
☐ Soil ☐ Sand ☐ Mud ☐ Underwater ☐ Snow

PHOTOGRAPHY: ☐ Without Scale ☐ With Scale

CASTING METHOD:

☐ Dental Stone ☐ Alginate ☐ Tape ☐ Stai-lift
☐ Mikrosil ☐ Silicon Rubber ☐ Snow Print Wax ☐ Electro-Static Print Lifter

PAGE ____ of ____

INITIALS ____

Appendix G: Trace Evidence Notes

TITLE: _____ DATE: _____

CASE NUMBER: _____ INVESTIGATOR: _____

[] SAMPLE

☐ Hair ☐ Fiber ☐ Soil ☐ Building Material

☐ Explosive Residue ☐ Fire Residue

DETECTION METHOD:

☐ Visible ☐ Oblique ☐ UV ☐ FLS

☐ Hydrocarbon Detector ☐ Aromatic ☐ Canine

COLLECTION METHOD:

☐ Swab ☐ Pipette ☐ Swatch
☐ Scraping ☐ Forceps ☐ Seize Item

PACKAGING METHOD:

☐ Test Tube ☐ Druggist Fold ☐ Paint Can
☐ Envelope ☐ Tape Lift ☐ Other _____

LOCATION:

[] SAMPLE

☐ Hair ☐ Fiber ☐ Soil ☐ Building Material

☐ Explosive Residue ☐ Fire Residue

DETECTION METHOD:

☐ Visible ☐ Oblique ☐ UV ☐ FLS

☐ Hydrocarbon Detector ☐ Aromatic ☐ Canine

COLLECTION METHOD:

☐ Swab ☐ Pipette ☐ Swatch
☐ Scraping ☐ Forceps ☐ Seize Item

PACKAGING METHOD:

☐ Test Tube ☐ Druggist Fold ☐ Paint Can
☐ Envelope ☐ Tape Lift ☐ Other _____

LOCATION:

[] SAMPLE

☐ Hair ☐ Fiber ☐ Soil ☐ Building Material

☐ Explosive Residue ☐ Fire Residue

DETECTION METHOD:

☐ Visible ☐ Oblique ☐ UV ☐ FLS

☐ Hydrocarbon Detector ☐ Aromatic ☐ Canine

COLLECTION METHOD:

☐ Swab ☐ Pipette ☐ Swatch
☐ Scraping ☐ Forceps ☐ Seize Item

PACKAGING METHOD:

☐ Test Tube ☐ Druggist Fold ☐ Paint Can
☐ Envelope ☐ Tape Lift ☐ Other _____

LOCATION:

PAGE ____ of ____

INITIALS ____

Appendix H: Death Scene Entry log

TITLE: _____ DATE: _____

CASE NUMBER: _____ INVESTIGATOR: _____

LOCATION: _____

TIME LOG OPENED: _____ OPENED BY: _____

ALREADY ON-SCENE: _____

NAME	ORGANIZATION	TIME IN	TIME OUT

Appendix I: Photographic Log

TITLE: _____ DATE: _____

CASE NUMBER: _____ INVESTIGATOR: _____

Camera: _____ Lens: _____

Filters: _____ Macro Lens: _____

☐ Digital SLR ☐ Digital Point & Shoot ☐ Film SLR ☐ Point & Shoot


Film Type: ☐ Color Print ☐ Color Slide ☐ Black and White ISO # ____

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____
- 8. _____
- 9. _____
- 10. _____
- 11. _____
- 12. _____
- 13. _____
- 14. _____
- 15. _____
- 16. _____
- 17. _____
- 18. _____
- 19. _____
- 20. _____

PAGE ____ of ____

INITIALS _____

Appendix J: Photographic Head Slate

0%	Photographic Head Slate
10%	
20%	Department/Agency: _____
30%	Case/Incident #: _____
40%	Photographer: _____
50%	
60%	Location: _____
70%	_____
80%	
90%	Date: _____
100%	

Appendix K: Immersion Burn Worksheet

IMMERSION BURN WORKSHEET

CASE NUMBER: _____ DATE: _____
 TITLE: _____ TIME: _____
 VICTIM: _____
 LOCATION: _____

TYPE OF BASIN:	Bathtub	Bathroom Sink	Kitchen Sink	Other: _____
MEASUREMENTS:	Width _____	Length _____	Depth _____	Other _____
MATERIAL:	Porcelain	Fiberglass	Steel	Iron Plastic Other _____
MANUFACTURER:	_____		MODEL: _____	

TYPE OF FIXTURES:	Single Temperature Control	Dual Temperature Control	Spray Attachment
	Shower Head	Bathtub Spout	Single Spout Separate Hot/Cold Spouts
MANUFACTURER:	_____		MODEL: _____

HOT WATER HEATER:			
MANUFACTURER:	MAKE:	MODEL:	
SERIAL NUMBER:	CAPACITY:		
THERMOSTAT SETTING: Upper _____ Lower _____			

RUNNING WATER TEMPERATURES			
HOT WATER		COLD WATER	
seconds	temperature	seconds	temperature
0		0	
5		5	
10		10	
20		20	
30		30	
40		40	
50		50	
60		60	
70		70	
80		80	
90		90	
100		100	
110		110	

STANDING WATER - FULL HOT			
Temperature recorded from mid-basin at mid-depth			
FILL TIME		TEMPERATURE	
		Measured from time water is turned off	
depth	time	minutes	temperature
1		0	
2		1	
3		5	
4		10	
5		15	
6		20	
7		25	
8		30	
9		35	
10		40	

_____ ran a separate basin of water at my request. The temperature was _____ degrees at a depth of _____ inches one minute after the water was turned off. Measurements were made at mid-basin, mid-depth.

Thermometer: Make: _____ Model: _____ Size: _____ Range: _____

Appendix L: SUID Scene Worksheet

Sudden Unexplained Infant Death Investigation

SUIDI
Reporting Form

INVESTIGATION DATA

Infant's Information: Last _____ First _____ M. _____ Case # _____

Sex: ☐ Male ☐ Female Date of Birth _____ / _____ / _____ Age _____ Months SS# _____
Month Day Year Months

Race: ☐ White ☐ Black/African Am. ☐ Asian/Pacific Islander ☐ Am. Indian/Alaskan Native ☐ Hispanic/Latino ☐ Other

Infant's Primary Residence Address:
Address _____ City _____ County _____ State _____ Zip _____

Incident Address:
Address _____ City _____ County _____ State _____ Zip _____

Contact Information for Witness:
Relationship to the deceased: ☐ Birth Mother ☐ Birth Father ☐ Grandmother ☐ Grandfather
☐ Adoptive or Foster Parent ☐ Physician ☐ Health Records ☐ Other: _____
Last _____ First _____ M. _____ SS # _____
Home Address _____ City _____ State _____ Zip _____
Place of Work _____ City _____ State _____ Zip _____
Phone (H) _____ Phone (W) _____ Date of Birth _____ / _____ / _____
Month Day Year

WITNESS INTERVIEW

1 Are you the usual caregiver? ☐ Yes ☐ No

2 Tell me what happened: _____

3 Did you notice anything unusual or different about the infant in the last 24 hrs? ☐ No ☐ Yes ⇨ Describe: _____

4 Did the infant experience any falls or injury within the last 72 hrs? ☐ No ☐ Yes ⇨ Describe: _____

5 When was the infant **LAST PLACED**? _____ / _____ / _____ : _____
Month Day Year Military Time Location (room)

6 When was the infant **LAST KNOWN ALIVE(LKA)**? _____ / _____ / _____ : _____
Month Day Year Military Time Location (room)

7 When was the infant **FOUND**? _____ / _____ / _____ : _____
Month Day Year Military Time Location (room)

8 Explain how you knew the infant was still alive. _____

9 Where was the infant - (P)laced, (L)ast known alive, (F)ound (circle P, L, or F in front of appropriate response)?
P L F Bassinet P L F Bedside co-sleeper P L F Car seat P L F Chair
P L F Cradle P L F Crib P L F Floor P L F In a person's arms
P L F Mattress/box spring P L F Mattress on floor P L F Playpen P L F Portable crib
P L F Sofa/couch P L F Stroller/carriage P L F Swing P L F Waterbed
P L F Other _____

WITNESS INTERVIEW (cont.)

10 In what position was the infant **LAST PLACED**? ☐ Sitting ☐ On back ☐ On side ☐ On stomach ☐ Unknown
Was this the infant's usual position? ☐ Yes ☐ No → What was the infant's usual position? _____

11 In what position was the infant **LKA**? ☐ Sitting ☐ On back ☐ On side ☐ On stomach ☐ Unknown
Was this the infant's usual position? ☐ Yes ☐ No → What was the infant's usual position? _____

12 In what position was the infant **FOUND**? ☐ Sitting ☐ On back ☐ On side ☐ On stomach ☐ Unknown
Was this the infant's usual position? ☐ Yes ☐ No → What was the infant's usual position? _____

13 FACE position when **LAST PLACED**? ☐ Face down on surface ☐ Face up ☐ Face right ☐ Face left

14 NECK position when **LAST PLACED**? ☐ Hyperextended (*head back*) ☐ Flexed (*chin to chest*) ☐ Neutral ☐ Turned

15 FACE position when **LKA**? ☐ Face down on surface ☐ Face up ☐ Face right ☐ Face left

16 NECK position when **LKA**? ☐ Hyperextended (*head back*) ☐ Flexed (*chin to chest*) ☐ Neutral ☐ Turned

17 FACE position when **FOUND**? ☐ Face down on surface ☐ Face up ☐ Face right ☐ Face left

18 NECK position when **FOUND**? ☐ Hyperextended (*head back*) ☐ Flexed (*chin to chest*) ☐ Neutral ☐ Turned

19 What was the infant wearing? (*ex. t-shirt, disposable diaper*) _____

20 Was the infant tightly wrapped or swaddled? ☐ No ☐ Yes → Describe: _____

21 Please indicate the types and numbers of layers of bedding both over and under infant (not including wrapping blanket):

Bedding UNDER Infant		Bedding OVER Infant	
None	Number	None	Number
Receiving blankets	<input type="checkbox"/>	Receiving blankets	<input type="checkbox"/>
Infant/child blankets	<input type="checkbox"/>	Infant/child blankets	<input type="checkbox"/>
Infant/child comforters (<i>thick</i>)	<input type="checkbox"/>	Infant/child comforters (<i>thick</i>)	<input type="checkbox"/>
Adult comforters/duvets	<input type="checkbox"/>	Adult comforters/duvets	<input type="checkbox"/>
Adult blankets	<input type="checkbox"/>	Adult blankets	<input type="checkbox"/>
Sheets	<input type="checkbox"/>	Sheets	<input type="checkbox"/>
Sheepskin	<input type="checkbox"/>	Pillows	<input type="checkbox"/>
Pillows	<input type="checkbox"/>	Other, specify:	
Rubber or plastic sheet	<input type="checkbox"/>		
Other, specify:			

22 Which of the following devices were operating in the infant's room?
☐ None ☐ Apnea monitor ☐ Humidifier ☐ Vaporizer ☐ Air purifier ☐ Other _____

23 What was the temperature of the infant's room? ☐ Hot ☐ Cold ☐ Normal ☐ Other _____

24 Which of the following items were near the infant's face, nose, or mouth?
☐ Bumper pads ☐ Infant pillows ☐ Positional supports ☐ Stuffed animals ☐ Toys ☐ Other _____

25 Which of the following items were within the infant's reach? ☐ Blankets ☐ Toys ☐ Pillows
☐ Pacifier ☐ Nothing ☐ Other _____

26 Was anyone sleeping with the infant? ☐ No ☐ Yes → Name these people.
Name _____ Age _____ Height _____ Weight _____ Location in Relation to Infant _____ Impaired (*intoxicated, tired*) _____

27 Was there evidence of wedging? ☐ No ☐ Yes → Describe: _____

28 When the infant was found, was s/he: ☐ Breathing ☐ Not breathing
If not breathing, did you witness the infant stop breathing? ☐ No ☐ Yes

WITNESS INTERVIEW (cont.)

29

What had led you to check on the infant?

30

Describe infant's appearance when found.

Unknown

No

Yes

Describe and specify location:

a) Discoloration around face/nose/mouth

b) Secretions (foam, froth)

c) Skin discoloration (livor mortis)

d) Pressure marks (pale areas, blanching)

e) Rash or petechiae (small, red blood spots on skin, membranes, or eyes)

f) Marks on body (scratches or bruises)

g) Other

31

What did the infant feel like when found? (Check all that apply.)

☐ Sweaty

☐ Warm to touch

☐ Cool to touch

☐ Limp, flexible

☐ Rigid, stiff

☐ Unknown

Other → Specify:

32

Did anyone else other than EMS try to resuscitate the infant?

☐ No

☐ Yes → Who and when?

Who

Month

Day

Year

Military Time

33

Please describe what was done as part of resuscitation:

34

Has the parent/caregiver ever had a child die suddenly and unexpectedly?

☐ No

☐ Yes → Explain

INFANT MEDICAL HISTORY

1

Source of medical information:

☐ Doctor

☐ Other healthcare provider

☐ Medical record

☐ Mother/primary caregiver

☐ Family

☐ Other:

2

In the 72 hours prior to death, did the infant have:

Unknown

No

Yes

a) Fever

b) Excessive sweating

c) Lethargy or sleeping more than usual

d) Fussiness or excessive crying

e) Decrease in appetite

f) Vomiting

g) Choking

Unknown

No

Yes

h) Diarrhea

i) Stool changes

j) Difficulty breathing

k) Apnea (stopped breathing)

l) Cyanosis (turned blue/gray)

m) Seizures or convulsions

n) Other, specify

3

In the 72 hours prior to death, was the infant injured or did s/he have any other condition(s) not mentioned?

☐ No

☐ Yes → Describe:

4

In the 72 hours prior to the infants death, was the infant given any vaccinations or medications?

(Please include any home remedies, herbal medications, prescription medicines, over-the-counter medications.)

☐ No

☐ Yes → List below:

Name of vaccination or medication

Dose last given

Date given

Month

Day

Year

Approx. time
Military Time

Reasons given/
comments:

1.

/

/

2.

/

/

3.

/

/

4.

/

/

Page 3

INFANT MEDICAL HISTORY (cont.)

5 At any time in the infant's life, did s/he have a history of?

	Unknown	No	Yes	Describe:
a) Allergies (food, medication, or other)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒
b) Abnormal growth or weight gain/loss....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒
c) Apnea (stopped breathing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒
d) Cyanosis (turned blue/gray)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒
e) Seizures or convulsions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒
f) Cardiac (heart) abnormalities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒
g) Metabolic disorders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒
h) Other.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒

6 Did the infant have any birth defects(s)? ☐ No ☐ Yes

Describe: _____

7 Describe the two most recent times that the infant was seen by a physician or health care provider: (Include emergency department visits, clinic visits, hospital admissions, observational stays, and telephone calls)

	First most recent visit	Second most recent visit
a) Date	Month / Day / Year	Month / Day / Year
b) Reason for visit.....	_____	_____
c) Action taken	_____	_____
d) Physician's name	_____	_____
e) Hospital/clinic.....	_____	_____
f) Address	_____	_____
g) City.....	_____	_____
h) State, ZIP	_____	_____
i) Phone number	() -	() -

8 Birth hospital name:

Street _____

City _____ State _____ Zip _____

Date of discharge Month / Day / Year

9 What was the infant's length at birth? _____ inches **or** _____ centimeters

10 What was the infant's weight at birth? _____ pounds _____ ounces **or** _____ grams

11 Compared to the delivery date, was the infant born on time, early, or late?

☐ On time ☐ Early—How many weeks early? _____ ☐ Late—How many weeks late? _____

12 Was the infant a singleton, twin, triplet, or higher gestation?

☐ Singleton ☐ Twin ☐ Triplet ☐ Quadruplet or higher gestation

13 Were there any complications during delivery or at birth? (emergency c-section, child needed oxygen)

☐ No ☐ Yes ⇒ Describe the complications: _____

14 Are there any alerts to pathologist? (previous infant deaths in family, newborn screen results)

☐ No ☐ Yes ⇒ Specify: _____

INFANT DIETARY HISTORY

1 On what day and at what approximate time was the infant last fed?

____/____/____ :____
Month Day Year Military Time

2 What is the name of the person who last fed the infant? _____

3 What is his/her relationship to the infant? _____

4 What foods and liquids was the infant fed in the **last 24 hours** (include last fed)?

	Unknown	No	Yes	Quantity	Specify: (type and brand if applicable)
a) Breast milk (one/both sides, length of time)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒ _____ ounces	_____
b) Formula (brand, water source - ex. Similac, tap water) ..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒ _____ ounces	_____
c) Cow's milk.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒ _____ ounces	_____
d) Water (brand, bottled, tap, well)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒ _____ ounces	_____
e) Other liquids (teas, juices)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒ _____ ounces	_____
f) Solids	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒ _____	_____
g) Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	⇒ _____	_____

5 Was a new food introduced in the 24 hours prior to his/her death?

☐ No ☐ Yes ⇒ Describe (ex. content, amount, change in formula, introduction of solids)

6 Was the infant last placed to sleep with a bottle?

☐ Yes ☐ No ⇒ Skip to question **9** below

7 Was the bottle propped? (i.e., object used to hold bottle while infant feeds)

☐ No ☐ Yes ⇒ What object was used to prop the bottle? _____

8 What was the quantity of liquid (in ounces) in the bottle? _____

9 Did death occur during? ☐ Breast-feeding ☐ Bottle-feeding ☐ Eating solid foods ☐ Not during feeding

10 Are there any factors, circumstances, or environmental concerns that may have impacted the infant that have not yet been identified? (ex. exposed to cigarette smoke or fumes at someone else's home, infant unusually heavy, placed with positional supports or wedges)

☐ No ☐ Yes ⇒ Describe concerns: _____

PREGNANCY HISTORY

1 Information about the infant's birth mother:

First name _____ Middle name _____

Last name _____ Maiden name _____

Date of Birth: ____/____/____ SS # ____ - ____ - ____
Month Day Year

Current Address: _____ City _____ State _____ Zip _____

How long has the birth mother been a resident at this address? ____ and ____ Months
Years

2 At how many weeks or months did the birth mother begin prenatal care?

____ Weeks ____ Months ☐ No prenatal care ☐ Unknown

3 Where did the birth mother receive prenatal care? (Please specify physician or other health care provider name and address.)

Physician/ Hospital/ _____
provider clinic _____ Phone (____) _____

Street _____ City _____

State _____ Zip _____

PREGNANCY HISTORY (cont.)

4 During her pregnancy with the infant, did the birth mother have any complications?

(ex. high blood pressure, bleeding, gestational diabetes)

☐ No ☐ Yes ⇨ Specify: _____**5 Was the birth mother injured during her pregnancy with the infant?** (ex. auto accident, falls)☐ No ☐ Yes ⇨ Specify: _____**6 During her pregnancy, did she use any of the following?**

	Unknown	No	Yes	Daily consumption		Unknown	No	Yes	Daily consumption
a) Over the counter medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	d) Cigarettes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Prescription medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	e) Alcohol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Herbal remedies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	f) Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

7 Currently, does any caregiver use any of the following?

	Unknown	No	Yes	Daily consumption		Unknown	No	Yes	Daily consumption
a) Over the counter medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	d) Cigarettes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Prescription medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	e) Alcohol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Herbal remedies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	f) Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

INCIDENT SCENE INVESTIGATION

1 Where did the incident or death occur? _____**2 Was this the primary residence?** ☐ Yes ☐ No**3 Is the site of the incident or death scene a daycare or other childcare setting?**☐ Yes ☐ No ⇨ Skip to question 8 below.**4 How many children were under the care of the provider at the time of the incident or death?** _____ (under 18 years old)**5 How many adults were supervising the child(ren)?** _____ (18 years or older)**6 What is the license number and licensing agency for the daycare?**

License number: _____ Agency: _____

7 How long has the daycare been open for business? _____**8 How many people live at the site of the incident or death scene?**

_____ Number of adults (18 years or older) _____ Number of children (under 18 years old)

9 Which of the following heating or cooling sources were being used? (Check all that apply.)

<input type="checkbox"/> Central air	<input type="checkbox"/> Gas furnace or boiler	<input type="checkbox"/> Wood burning fireplace	<input type="checkbox"/> Open window(s)
<input type="checkbox"/> A/C window unit	<input type="checkbox"/> Electric furnace or boiler	<input type="checkbox"/> Coal burning furnace	<input type="checkbox"/> Wood burning stove
<input type="checkbox"/> Ceiling fan	<input type="checkbox"/> Electric space heater	<input type="checkbox"/> Kerosene space heater	
<input type="checkbox"/> Floor/table fan	<input type="checkbox"/> Electric baseboard heat	<input type="checkbox"/> Other ⇨ Specify: _____	
<input type="checkbox"/> Window fan	<input type="checkbox"/> Electric (radiant) ceiling heat	<input type="checkbox"/> Unknown	

10 Indicate the temperature of the room where the infant was found unresponsive:

_____ Thermostat setting _____ Thermostat reading _____ Actual room temp. _____ Outside temp.

11 What was the source of drinking water at the site of the incident or death scene? (Check all that apply.)

<input type="checkbox"/> Public/municipal water source	<input type="checkbox"/> Bottled water	<input type="checkbox"/> Other ⇨ Specify: _____
<input type="checkbox"/> Well	<input type="checkbox"/> Unknown	

12 The site of the incident or death scene has: (check all that apply)

<input type="checkbox"/> Insects	<input type="checkbox"/> Mold growth	<input type="checkbox"/> Odors or fumes ⇨ Describe: _____
<input type="checkbox"/> Smoky smell (like cigarettes)	<input type="checkbox"/> Pets	<input type="checkbox"/> Presence of alcohol containers
<input type="checkbox"/> Dampness	<input type="checkbox"/> Peeling paint	<input type="checkbox"/> Presence of drug paraphernalia
<input type="checkbox"/> Visible standing water	<input type="checkbox"/> Rodents or vermin	<input type="checkbox"/> Other ⇨ Specify: _____

13 Describe the general appearance of incident scene: (ex. cleanliness, hazards, overcrowding, etc.)

INVESTIGATION SUMMARY

- 1** Are there any factors, circumstances, or environmental concerns about the incident scene investigation that may have impacted the infant that have not yet been identified?

2 Arrival times: Law enforcement at scene: _____ : _____ : _____ Military Time DSI at scene: _____ : _____ : _____ Military Time Infant at hospital: _____ : _____ : _____ Military Time

Investigator's Notes

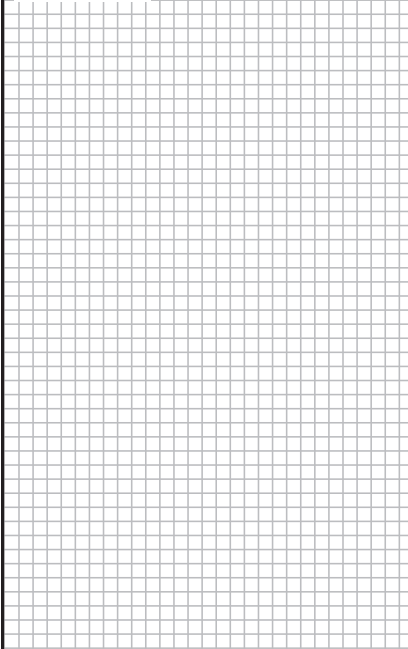
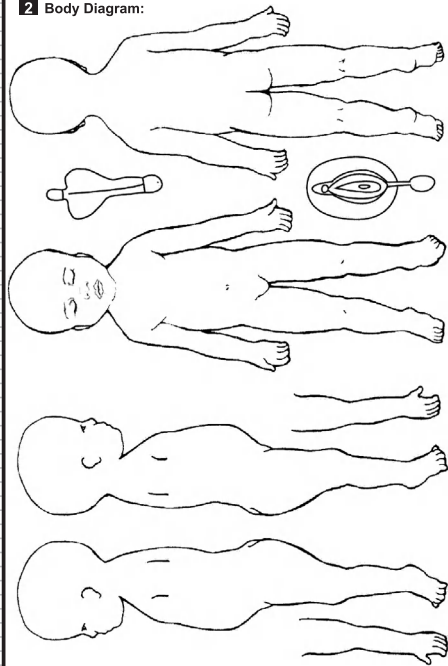
Indicate the task(s) performed.

- | | | |
|--|---|--|
| <input type="checkbox"/> Additional scene(s)? (forms attached) | <input type="checkbox"/> Doll reenactment/scene re-creation | <input type="checkbox"/> Photos or video taken and noted |
| <input type="checkbox"/> Materials collected/evidence logged | <input type="checkbox"/> Referral for counseling | <input type="checkbox"/> EMS run sheet/report |
| <input type="checkbox"/> Notify next of kin or verify notification | <input type="checkbox"/> 911 tape | |

If more than one person was interviewed, does the information differ?

- ☐ No ☐ Yes → Detail any differences, inconsistencies of relevant information: (ex. placed on sofa, last known alive on chair.)

INVESTIGATION DIAGRAMS

1 Scene Diagram:**2** Body Diagram:

		SUMMARY FOR PATHOLOGIST	
Case Information	Investigator Information:	Name _____	Agency _____ Phone _____
	Investigated:	Month / Day / Year _____ Military Time _____	Pronounced Dead: Month / Day / Year _____ Military Time _____
Sleeping Environment	Infant's Information:	Last _____ First _____ M. _____	Case # _____
	Sex:	<input type="checkbox"/> Male <input type="checkbox"/> Female	Date of Birth _____ Month / Day / Year _____ Age _____ Months
	Race:	<input type="checkbox"/> White <input type="checkbox"/> Black/African Am. <input type="checkbox"/> Asian/Pacific Islander <input type="checkbox"/> Am. Indian/Alaskan Native <input type="checkbox"/> Hispanic/Latino <input type="checkbox"/> Other _____	
Infant History	1 Indicate whether preliminary investigation suggests any of the following: Yes No <input type="checkbox"/> <input type="checkbox"/> Asphyxia (ex. overlying, wedging, choking, nose/mouth obstruction, re-breathing, neck compression, immersion in water) <input type="checkbox"/> <input type="checkbox"/> Sharing of sleep surface with adults, children, or pets <input type="checkbox"/> <input type="checkbox"/> Change in sleep condition (ex. unaccustomed stomach sleep position, location, or sleep surface) <input type="checkbox"/> <input type="checkbox"/> Hyperthermia/Hypothermia (ex. excessive wrapping, blankets, clothing, or hot or cold environments) <input type="checkbox"/> <input type="checkbox"/> Environmental hazards (ex. carbon monoxide, noxious gases, chemicals, drugs, devices) <input type="checkbox"/> <input type="checkbox"/> Unsafe sleep condition (ex. couch/sofa, waterbed, stuffed toys, pillows, soft bedding)		
	<input type="checkbox"/> <input type="checkbox"/> Diet (e.g., solids introduced, etc.) <input type="checkbox"/> <input type="checkbox"/> Recent hospitalization <input type="checkbox"/> <input type="checkbox"/> Previous medical diagnosis <input type="checkbox"/> <input type="checkbox"/> History of acute life-threatening events (ex. apnea, seizures, difficulty breathing) <input type="checkbox"/> <input type="checkbox"/> History of medical care without diagnosis <input type="checkbox"/> <input type="checkbox"/> Recent fall or other injury <input type="checkbox"/> <input type="checkbox"/> History of religious, cultural, or ethnic remedies <input type="checkbox"/> <input type="checkbox"/> Cause of death due to natural causes other than SIDS (ex. birth defects, complications of preterm birth) <input type="checkbox"/> <input type="checkbox"/> Prior sibling deaths <input type="checkbox"/> <input type="checkbox"/> Previous encounters with police or social service agencies <input type="checkbox"/> <input type="checkbox"/> Request for tissue or organ donation <input type="checkbox"/> <input type="checkbox"/> Objection to autopsy		
	<input type="checkbox"/> <input type="checkbox"/> Pre-terminal resuscitative treatment <input type="checkbox"/> <input type="checkbox"/> Death due to trauma (injury), poisoning, or intoxication		
	<input type="checkbox"/> <input type="checkbox"/> Suspicious circumstances <input type="checkbox"/> <input type="checkbox"/> Other alerts for pathologist's attention		
	Any "Yes" answers should be explained and detailed.		
	Brief description of circumstances: _____		

Pathologist	2 Pathologist Information: Name _____ Agency _____ Phone (_____) _____ - _____ Fax (_____) _____ - _____		

Appendix M: Firearms Documentation worksheet

FIREARMS DOCUMENTATION WORKSHEET

TITLE: _____ DATE: _____
Case Number: _____
Circumstances Of Recovery: _____

WEAPON:
Handgun: Automatic Semi-Automatic Revolver Bolt Action Break Action: Single shot Double shot
Rifle: Automatic Semi-Automatic Magazine Fed Tube Fed Lever Action Break Action Pump
Shotgun: Automatic Semi-Automatic Pump Break Action: Single Barrel Double Barrel Bolt Action
Double Action Single Action

Manufacturer: _____ Model: _____ Serial Number: _____
Other: _____

Safety: Left Handed Right Handed On Off

Decock Lever: Left Handed Right Handed

Magazine Release: Left Handed Right Handed

Magazine: Fully Seated Partially Seated Removed Manufacturer: _____

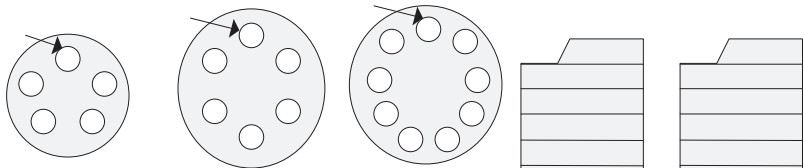
Slide: Forward Locked to the Rear

Hammer: Fully Cocked 3/4 Cocked 1/2 Cocked 1/4 Cocked Not Cocked

AMMUNITION TYPE

Note: If ammunition differs, designate by cylinder number, magazine number or evidence item number.

	Ball Not Jacketed	Hollow Point Jacket	Wad Cutter Semi-Jacketed	Specialty: Other: _____
Caliber:	.22	.25 .32	.38/357 .380 .41	.44 .45
Millimeter:	9mm	10mm		
Gauge:	12	16 20	28	.410 Shot Size: _____
Manufacturer: _____			Make: _____	Lot Number: _____



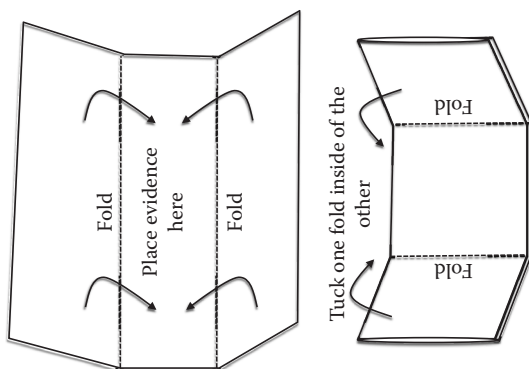
Begin #1 with cylinder chamber that is in line with the barrel. Continue numbering clockwise or counterclockwise based upon the direction the cylinder turns. Package each round separately

- | | | | | | |
|----|-------|---------|-----------|-------|-------------------|
| 1. | Fired | Misfire | Not Fired | Empty | Head Stamp: _____ |
| 2. | Fired | Misfire | Not Fired | Empty | Head Stamp: _____ |
| 3. | Fired | Misfire | Not Fired | Empty | Head Stamp: _____ |
| 4. | Fired | Misfire | Not Fired | Empty | Head Stamp: _____ |
| 5. | Fired | Misfire | Not Fired | Empty | Head Stamp: _____ |
| 6. | Fired | Misfire | Not Fired | Empty | Head Stamp: _____ |
| 7. | Fired | Misfire | Not Fired | Empty | Head Stamp: _____ |
| 8. | Fired | Misfire | Not Fired | Empty | Head Stamp: _____ |
| 9. | Fired | Misfire | Not Fired | Empty | Head Stamp: _____ |

Post-Blast Scene Management

- Use Polar Coordinate Method from SoB to document location of all suspected
 - device components
 - biological evidence
 - farthest piece of debris

Appendix O: Druggist Fold



Appendix P: Post Mortem Indicators Worksheet

Post Mortem Indicator (PMI)
Worksheet

Time (Hourly)	Livor Mortis			Rigor Mortis			Algor Mortis		
	Visible (Y or N)	Fixed (Y or N)	Consistant with Position (Y or N)	Present (Y or N)	Full or Partial (F or P)	Consistant with Position (Y or N)	Body Temp	Air Temp	Surface Temp

Title: _____

Date: _____

Case: _____

Investigator: _____

